The Dissertation Committee for Dan Wei

Certifies that this is the approved version of the following dissertation:

Two Essays on International Corporate Finance

Committee:

_____

Laura Starks, Supervisor

_____

Andres Almazan

_____

Tyrone Callahan

_____

Li Gan

_____

Sheridan Titman

Two Essays on International Corporate Finance

by

Dan Wei, M.S.

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I dedicate the work herein to my parents, Suhua Ma and Feng Wei.

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Dan Wei

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Two Essays on International Corporate Finance

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Dan Wei, Ph.D.
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Supervisor: Laura Starks

The increasing globalization in recent years means that issues related to cross-border transactions have greater impact on firm value. In this paper I examine two aspects of them: asymmetric information and foreign exchange risk. In the first essay, I empirically examine the impact of information asymmetry on characteristics of cross-border mergers. The role of asymmetric information regarding the acquirer's quality is motivated in the context of an entry decision model where there exists a fixed entry cost associated with direct entry and asymmetric information in the merger process. I find that acquisitions will more likely be foreign firms' mode of entry for those industries that are less competitive or have higher entry costs. Further, I show that acquirers (targets) in cross-border deals experience smaller (larger) wealth gains than do acquirers (targets) in domestic cross-industry deals. These differences in takeover premiums are mainly driven by entries into those industries with small fixed entry cost or high level of competition. Finally, I find that target and bidder

takeover premiums vary systematically across different industries and bidders from different countries according to the degree of information asymmetry involved. The empirical results imply that asymmetric information affects foreign firms' mode of foreign direct investment and causes the market to react differently to domestic cross-industry and cross-border mergers in the U.S. In the second essay, I investigate another problem that widely affects all firms involved in foreign businesses. That is, I try to explain how much a firm's stock price should be affected the currency risk. Using a sample of U.S. manufacturing firms, I find that firms with higher expected costs of financial distress, as proxied by lower liquidity, higher level of short-term leverage, smaller size and greater growth opportunity, are more likely to exhibit significant exchange rate exposures. At the industry level, the relation between exchange rate exposure and expected cost of financial distress appears to be even stronger. Finally, using an event study methodology, I provide evidence that firms with higher expected costs of financial distress show larger reactions to large, unexpected exchange rate shocks.

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Chapter 1

Issues Related to Cross-Border Transactions

The past decades have seen dramatic development of foreign trade, foreign direct investment, and international financial markets. Various barriers to international capital flow such as lack of tax harmonization, government restrictions on foreign investment, high transaction costs have fallen substantially. The increasing globalization means that issues related to cross-border transactions have greater impact on firm value than before. Current research has documented significant benefits of global integration. For example, according to De Santis and Gerard (1997), the expected gains from international diversi-

fication for an investor average 2.11 percent per year. At the same time, there is also evidence that investors have not fully realized the benefits by investing in foreign markets as much as one would expect. One obvious example is the well-documented "home bias".[1] Moreover, as shown in Christophe (1997) international operations during the early 1980s are associated with decreased firm value due to sunk costs required to establish foreign market shares and hysteresis in response to currency fluctuation. Therefore, it is important to clearly identify issues that will become more pronounced when firms from different cultural and economic backgrounds are involved. In this study, I focus on two aspects of them: asymmetric information and foreign exchange risk.

In the first essay, I empirically examine the impact of information asymmetry on characteristics of cross-border mergers. The role of asymmetric information regarding the acquirer's quality is motivated in the context of an entry decision model where there exists a fixed entry cost associated with direct entry and asymmetric information regarding the bidder's value in the merger process. I show that whether foreign firms enter a new market via direct entry or cross-border mergers depends on the trade-off between these two types of costs. In equilibrium, entry mode signals the type of the entrant:

[1]See French and Porterba (1991), Cooper and Kaplanis (1994) and Kang and Stulz (1997)

high efficiency entrants enter directly while low efficiency ones enter through a merger. Therefore, across different industries and over time we should expect more mergers than direct investments when fixed entry costs are larger. Furthermore, since information asymmetry is resolved through the revelation of a firm's entry mode, the abnormal returns for the target and bidder around an acquisition should reflect the actual impact of the entry on the target and the true type of the bidder. In other words, how the market reacts to a merger announcement is related to the degree of information asymmetry.

Using the data of cross-border mergers in the U.S. during the period of 1981-1998, I find that the more severe asymmetric information involved in cross-border mergers causes the market to react very differently to cross-border mergers as compared to domestic cross-industry mergers.

A number of previous studies have examined the role of asymmetric information in the merger process. For example, Fishman (1989) studies the role of the medium of exchange when target and bidder management each has private information about the profitability of an acquisition. Similarly, Eckbo, Giammarino and Heinkel (1990) show that when the bidder's value is not known to the target, its revealed value is monotonically increasing and convex in the amount of cash used in the offer. Note that in these studies asymmetric

information affects the method of payment but not firms' real decisions. I contribute to current literature by showing that asymmetric information affects firms' entry decisions as well as their market valuations. Moreover, given that previous research (see, Harris and Ravanscraft, 1993; Swenson, 1993; Dewenter, 1995; and Eckbo and Thorburn, 2000) has not reached consensus regarding whether or why there exist differences in target or bidder takeover premiums between domestic and cross-border mergers, my study also sheds some light on this issue by linking it to the degree of information asymmetry involved in these mergers.

In the second essay, I investigate another problem that widely impacts all multinational firms. That is, I try to explain how much a firm's value should be affected by currency risk. I argue that although exchange rate movement may have direct impact on firms' cash flows, its ultimate impact on their stock prices varies cross-sectionally depending on the sensitivity of firm value to volatility of short-term cash flows. In other words, a firm's stock price, as a measure of firm value, is not necessarily affected by currency risk unless the firm's value is very sensitive to volatility of its cash flows. The reason is that multinational firms usually have broad base of local currency exposures that are likely to offset each other in the long run. In addition, firms can always

adjust themselves through operational hedging in the longer term. This, on the one hand, suggests cross-sectional variation of foreign exchange exposure with firms' expected costs of financial distress. On the other hand, it also helps explain the failure to document significant exchange rate exposures in previous research.

This study shows that the exchange rate risk becomes important to a firm's fundamental value only when the resulting short-term fluctuation of its cash flows forces it into financial distress or causes it to forsake investment opportunities. In other words, among firms with significant foreign businesses, stock prices of only a subset of them will exhibit significant sensitivities to exchange rate movements.

Using a sample of U.S. manufacturing firms, I show that stock prices of firms with higher expected costs of financial distress, for example, lower liquidity, smaller size and greater growth opportunities, are more likely to move with exchange rate. Among firms with significant return exposures, the magnitude of their exposures varies with variables that proxy for their expected financial distress costs. At the industry level, the relation between exchange rate exposure and financial characteristics becomes even more prominent. Finally, using an event study methodology, I calculate firms' abnormal returns and ab-

normal volatilities around large, unexpected currency movements to measure the economic significance of exchange rate exposures. The result shows that firms' responses to exchange rate shocks are economically large and vary with their expected costs of financial distress.

In summary, this study examines the effect of asymmetric information and foreign exchange risk–two important problems commonly faced by firms in multinational businesses–on firm valuation. The evidences provided here will help firms and investors identify potential risks in cross-border transactions and their impacts on firms' fundamental values.

Chapter 2

Takeover Versus Direct Entry: Asymmetric Information and Cross-Border Mergers and Acquisitions

2.1 Overview of the Study

Mergers and acquisitions surged substantially in terms of both the total number and the average value of deals during the 1990s. According to Gorton, Kahl

and Rosen (2000), the deal value of mergers and acquisitions in the United States increased from $100 billion in 1991 to $1.6 trillion in 1998. A significant portion of this activity was due to the dramatic increase of cross-border mergers and acquisitions. According to W. T. Grimm, foreign acquisitions of U.S. companies exceeded $170 billion in the last half of the 1980's, accounting for 17% of the total U.S. deals during that period. By 1999, that figure had climbed to 22%–the highest level since 1990.[1]

Given the prominence of cross-border merger and acquisition in the U.S. market as well as other markets around the world, it is important to understand how these transactions affect shareholders' wealth and whether they generate a differential impact than do otherwise similar domestic mergers.[2] Previous research documents mixed results on this question. Some evidence suggests significant differences between domestic and cross-border deals in terms of their wealth effects on target and bidding firm shareholders. For example, Harris and Ravenscraft (1991) and Swenson (1993) examine abnormal returns for U.S. targets around merger announcements and find significantly higher wealth gains for targets of foreign buyers than for targets of U.S. acquirers. Eckbo and Thorburn (2000) provide evidence for the Canadian market where

[1]Mergers Snapshot/Foreign Buyers, WSJ, June 19, 2000.

[2]Mergers, takeovers, mergers and acquisitions will be used interchangeably throughout the paper hereafter.

domestic bidders outperform the U.S. bidders in terms of takeover premiums. These findings indicate that stock prices react differently to domestic and cross-border takeover announcements. Further, the differences do not disappear after controlling for the method of payment, managerial resistance, competing bidders, industry differences, exchange rate movements and different tax regimes. In contrast, Dewenter (1995) studies takeovers in the U.S. chemical and retail industries and finds no differences between domestic and cross-border deals in the takeover premium levels within each industry. Given these diverse results, it is clear that current work has not reached consensus regarding this issue, nor has it been able to explain why we should or should not expect to observe any differences.

In this study, I further our understanding of cross-border mergers by examining mergers from the perspective of a firm's entry decision. Since a firm can enter a new market either by establishing its own business or by taking over an existing firm, the announcement of a cross-border merger reveals the bidding firm's choice of entry mode. The revelation of entry strategy provides information to investors about the bidding firm and about the impact of the entry on the target firm. This information is reflected in the abnormal returns to the two merging parties around the announcement period. I show that due

to the higher level of information asymmetry in cross-border transactions, the market reacts differently to domestic and foreign mergers.

Firms have various motivations for entering foreign markets, either through mergers or through direct investments. They may want to gain market power, to achieve financial and operating synergy, or to adjust themselves to changing environments brought by technological, regulatory or structural shocks. These motives are often the same as those proposed for domestic mergers. (See, for example, Mitchell and Mulherin, 1996). Unlike domestic mergers, however, foreign firms are entering a market that is to some extent segmented from their normal markets. They therefore face the unique challenge to communicate information about their quality to investors and target firms in the new market. So there exists the information asymmetry in the cross-border merger process which should be much more severe than in domestic transactions. The significance of this information asymmetry is exhibited by the extensive literature on "home bias". Although various barriers to foreign investments have been reduced substantially in recent years, investors' propensity to invest in their home markets remains strong simply because of the information problem.[3] Therefore, it is not surprising to see that a target

[3]For example, Kang and Stulz (1997) suggest that foreign ownerships of Japanese stocks are significantly lower in firms that are associated with more severe information asymmetry.

firm has more difficulty learning information about a foreign bidder than that of a comparable domestic bidder.

As an alternative to merger, direct investment involves certain level of fixed entry cost. For example, some upfront costs must be incurred when a firm establishes its own business. Alternatively, the fixed entry cost can be related to various entry barriers. One obvious example is customer loyalty. If a foreign firm tries to penetrate the U.S. soft drink market, then it has to first overcome customers' preference for Coke or Pepsi products.

Given the issues related to different modes of entry, one path to understanding the differences between cross-border and domestic mergers and acquisitions may be to first answer the question of what drives foreign firms to choose takeover over direct entry. In other words, what determines the entry mode of a foreign company?

To motivate my empirical analysis about the importance of information asymmetry in cross-border mergers, I develop a theoretical model based upon the trade-off between the fixed entry cost and the cost of information asymmetry. More specifically, the entry decision model presented in this study is similar in spirit to that of McCardle and Viswanathan (1994), in which firms choose between direct entry and merger when their efficiency in the new mar-

kets is private information only known to managements. Unlike McCardle and Viswanathan (1994), the information asymmetry in my model concerns the potential entrant's efficiency in the new market rather than its fixed entry cost. This setup allows the strategic response of other firms in the market to feed back to the entrant's equilibrium entry decision.

Two critical components of the model are the fixed entry cost associated with direct entry and the information asymmetry regarding bidders' efficiency in the new market. They together determine firms' entry modes and the cross-sectional variations in the market's reactions to different mergers. Without the fixed entry cost entrants are indifferent to different modes of entry. Without asymmetric information, all entrants prefer to enter by taking over the incumbent to avoid the fixed entry cost. Whether a separating equilibrium can be achieved depends on the trade-off between the cost of asymmetric information and the fixed entry cost.

When the efficiency of the entrant is public information, merging with one of the existing firms is preferable to direct entry due to the fixed entry cost. A high efficiency entrant will be able to take over the target at a lower price than if it is of low efficiency. This is because it can always threaten to enter the market directly and hurt the target through increased competition

if it has the ability to overcome the fixed entry cost. However, when the efficiency of the entrant is private information only known by the entrant's management, the low efficiency entrant has the incentive to mimic the high efficiency one and essentially impedes it from acquiring the target firm at low prices. Consequently, merger is not necessarily the optimal mode of entry. Depending on the fixed entry cost and the level of competition in the market, there can be either a separating or a pooling equilibrium. If the fixed entry cost is low and the market is very competitive, a separating equilibrium can be achieved where the entry mode signals the type of the entrant: the high efficiency type enters the market directly, incurring the fixed direct entry cost, while the low efficiency type enters through a merger. Otherwise, a pooling equilibrium sustains in which both types merge with the incumbent by paying its reservation price.

The information asymmetry regarding the entrant's efficiency in the new market affects its choice of entry mode. Under the separating equilibrium, the merger announcement, which eliminates the uncertainty about its entry mode, conveys information to investors about the entrant's type and the actual impact of market entry on the target. This information is incorporated into the announcement returns of the target and the acquirer. For the bidder's

shareholders, the merger announcement is a bad news because it reveals the low efficiency of the bidder. Target shareholders, however, should experience positive abnormal returns because the potential adverse impact of direct entry on the target firm is avoided.

My model generates several testable implications about cross-border deals in which both fixed entry cost and asymmetric information are important. In particular, it has implications on the cross-industry variation in the mode of foreign direct investment and the differential wealth effects generated by foreign versus domestic mergers. First, the higher the fixed entry cost is and the less competitive the market is, the more likely a pooling equilibrium will be reached. Therefore, we should observe cross-industry variation in the mode of foreign direct investment with the fixed entry cost and the degree of competition.[4] Second, assuming more information asymmetry in cross-border deals than in domestic cross-industry ones–which is another type of market entry, targets of foreign acquirers are expected to experience larger wealth gains while foreign acquirers should realize smaller announcement period returns. Moreover, since these overall differences are driven by the separating equilibrium, they should be more prominent in those industries with low fixed

[4]To test this prediction directly, one must be able to show that this relation is stronger in cross-border direct entry than in domestic one. Unfortunately, data on domestic direct entry are not available.

entry costs and high levels of competition.

Although the implications of this model are not specific to cross-border mergers and can potentially be applied to other types of market entry, they provide a new angle to examine cross-border mergers. First, I analyze cross-sectional differences in the proportion of mergers and acquisitions relative to total foreign direct investments. The results show that it varies significantly across different industries in a systematic fashion. Specifically, using industry characteristics that proxy for entry barriers and market competitiveness, I show that the higher the fixed entry cost is and the less competitive the market is, the more likely it is that foreign companies will enter that industry via takeovers.

Second, I examine the differences between domestic cross-industry and cross-border mergers and acquisitions in terms of announcement abnormal returns. Previous studies in this area do not distinguish different motivations of mergers that can lead to different stock market responses to the merger announcements. In this study I focus on mergers that are motivated by entries into another market. In other words, I compare domestic entry into another industry with cross-border entry into another country, which would involve more severe information asymmetry. By taking this approach, I provide an

explanation for differential market reactions to domestic versus cross-border mergers. In addition, my analysis spans a longer period and includes a larger sample compared with previous studies on takeover premiums to targets and bidders. Therefore, it has more power to detect any difference in wealth effects.

As predicted by the model, an event study analysis shows that cross-border deals generate significantly lower (higher) takeover premium to bidders (targets) than do domestic deals after controlling for the method of payment, managerial resistance, outside competition, exchange rate movements, the relative sizes of the target and bidder, tax effects and reputation of investment advisors. More importantly, these differences in shareholder wealth gains are mainly driven by those deals that take place in industries with low levels of fixed entry cost or high levels of competition. Consistent with the information asymmetry hypothesis, the differences are also much larger in industries that are more likely to be subject to the information asymmetry problem. Finally, I find that even among cross-border deals, target and bidder announcement abnormal returns vary across the bidder's country according to the degree of information asymmetry involved.

The rest of Chapter 2 is organized as follows. Section 2.2 reviews related literature. Section 2.3 presents the model and discusses its empirical implica-

tions. Sections 2.4 and 2.5 provide the empirical analysis on the two major testable implications of the model. Sections 2.7 and 2.8 check the robustness of the empirical analysis in Section 2.5. Finally, Section 2.9 concludes this chapter.

2.2 Literature Review

Research on cross-border mergers largely exists in the FDI literature before the 1990s. Harris and Ravenscraft (1991) are among the first to empirically link corporate merger to FDI through the comparison of takeover premium in domestic versus cross-border mergers. They provide evidence that costs and imperfections in product market play are the main driving forces behind cross-border mergers. By examining shareholder wealth gains for 1273 U.S. firms acquired during 1970-1987, they also find that targets of foreign buyers have significantly higher wealth gains than do targets of U.S. acquirers. Similarly, Swenson (1993) finds that target shareholder wealth gains generated in foreign acquisitions are almost 10 percent in excess of those in similar domestic acquisitions. Although both of these two studies show that the premium earned by foreign buyers is higher when the dollar depreciates as suggested by Froot and Stein (1991), they do not examine whether the effect of exchange

rate movement can explain difference in wealth gains between domestic and cross-border mergers. Furthermore, they find no evidence that deal characteristics, tax variables, or industrial variables have any explanatory power for the difference.

More recently, Eckbo and Thorburn (2000) look into difference between domestic and cross-border takeovers in terms of gains to bidders. They examine the performance of U.S.(foreign) and Canadian(domestic) bidder firms in the Canadian corporate control market during 1964-1983. In their study, domestic bidders are those firms that are traded on the TSE and foreign firms are those NYSE listed firms. They show that domestic bidders earn significantly positive average announcement period abnormal returns while the returns to foreign bidder are indistinguishable from zero. Among potential reasons for the difference, such as government control on FDI, relatedness of businesses of the two parties, method of payment, managerial resistance, and relative sizes of target and bidder, there is weak evidence to support the explanation that it is due to the measurement problem resulting from the larger size of US bidders compared with that of Canadian bidders.

Contrary to findings in these studies, Dewenter (1995) looks at takeovers in U.S. chemical and retail industries and concludes that there is no difference

in mean target takeover premia within industry. One possible explanation for this inconsistence may be that there exists cross industry variation in the differential market reactions to domestic and cross-border mergers depending on industry characteristics.

Recently, some studies model the merger activity from the perspective of entry decision that may shed light on our understanding of cross-border takeovers. McCardle and Viswanathan (1994) develop a Cournot oligopoly model to examine what factors determine a potential entrant's mode of entry. Under information asymmetry regarding the fixed entry cost, the entrant reveals its type through its entry strategy. In a separating equilibrium, the high entry cost firm chooses to merge with the incumbent while the low entry cost one chooses to enter directly. In response to information revealed from the entry mode, stock price of the acquirer drops and that of the target rises around the merger announcement. The results of their model are consistent with the extensive evidence on the asymmetric wealth effect of mergers on target and bidder shareholders.

The main focus of McCardle and Viswanathan (1994) is on stock performance around takeover announcement. It doesn't discuss cross-sectional differences in equilibrium entry mode and in market's reaction to merger an-

nouncement. But this approach of modeling merger activity has some interesting implications to cross-border mergers where both asymmetric information and fixed entry cost are significant. In this study, I try to explore whether or how the market reacts to domestic and cross-border takeovers differently by examining the relative role of these two factors in merger activity. I find that market's reaction to these two types of mergers is highly correlated with characteristics of industries and foreign countries involved.

2.3 The Model

2.3.1 The Set-Up

Since the main purpose of the model is to understand a single decision of direct entry versus merger with asymmetric information, the basic setup follows McCardle and Viswanathan (1994) but is simplified to be a one period model with two firms. Firm 1 is an incumbent firm in a pre-existing market with the marginal cost of C^I. Firm 2 has the opportunity to enter that market from a foreign country. The market inverse demand function is defined by:

$$P = a - b * Q; \qquad a > 0, b > 0$$

where P is the market price and Q is the total quantity produced in the market. Firm 2 is considering entering the market by either direct entry or taking over the incumbent. If it enters directly, it will incur a fixed entry cost of F. In addition, if firm 2 enters the market directly, the objective of both firms will be to maximize profits by choosing the optimal quantity in each period given the opponent's strategy. Firm 2 is of two possible types depending on its marginal cost. If firm 2 is a high efficiency entrant(H), it has a small marginal cost denoted by C^S. If firm 2 is a low efficiency entrant(L), it has a large marginal cost denoted by C^B. The following additional assumptions are made about the firms and the market:

- The entrant's type is private information known by the entrant's management, but not by its shareholders or the incumbent. The incumbent and investors' prior belief that an entrant is of type H is of probability 1/2.

- Whether $C^I \leq C^S < C^B$, $C^S < C^I \leq C^B$ or $C^S < C^B \leq C^I$ is common knowledge. That is, whether the entrant's marginal cost is greater than or equal to or less than or equal to that of the incumbent is known by the incumbent.

- The fixed entry cost F is such that only the high efficiency entrant's post

direct entry profit will be large enough to recover it. That is, $\pi_2^{E,L} < F < \pi_2^{E,H}$, where $\pi_2^{E,L}$and $\pi_2^{E,H}$are profits the low and high efficiency types can make after direct entry. In other words, H has the option between direct entry and takeover depending on the cost of paying a high price to acquirer firm 1 and the benefit of avoiding the fixed direct entry cost. L can only enter through taking over firm 1.

- The combined firm is more profitable than two stand-alone firms in the market given the fixed entry cost. That is, $\pi_2^{M,H} > \pi_1^{E,H} + \Pi_2^{E,H} > 0$, where $\pi_2^{M,H}$and $\pi_1^{E,H}$are profits H can make after taking over firm 1 and firm 1 can make if H enters directly. $\Pi_2^{E,H} = \pi_2^{E,H} - F$ is the payoff of H after direct entry net of the fixed entry cost.

- There is no correlation between the fixed entry cost and the marginal cost of the entrant. That is, the correlation between F and C^B or C^S is zero.

- If the entrant chooses to enter by merger, it makes a take-or-leave-it offer to the target.

- If a merger is successful, the combined firm will adopt the technology of the more efficient one of the two merging firms.

- If firm 2 enters the market directly, it will enter a two-firm Cournot competition with firm 1.
- There are no taxes.
- There are no agency problems. The managements of both firms always act on behalf of their shareholders.
- Firm 2's motivation to enter the preexisting market is exogenous, that is, firm 1 cannot affect that motivation through any action.

2.3.2 Symmetric Information

Before analyzing firm 2's entry decision, consider what happens if the efficiency of the entrant firm is public information. Without asymmetric information between firm 1 and firm 2 about firm 2's type, firm 2 will always prefer to merge with firm 1 regardless of its efficiency level. This results because the firm will face a fixed entry cost if it enters directly. The fixed entry cost occurs only for direct entry because firms that establish their presence in new markets usually need to spend money on plants, offices, legal fees and other administrative expenses. The fixed entry cost becomes more important if a firm is entering another country due to non-financial fixed entry costs such as language or culture differences. Although the assumption of a fixed cost only

in the case of direct entry is a simplification, as long as the fixed cost is higher in direct entry than in a merger, all results remain unchanged.

Under symmetric information, once firm 2 has made the merger offer, firm 1 decides whether to accept the offer by weighing the bid against the potential loss of profits if it turns down the offer and firm 2 adopts direct entry subsequently. Since firm 1 knows that the low efficiency bidder (L) is not able to enter the market directly, it will ask for a price no less than its current profit when facing a bidder with type L. When facing the high efficiency bidder (H), which can always access the market directly resulting in lower future profits for firm 1, firm 1 will accept any offer that is equal to or greater than its share of profits in the two-firm Cournot competition with H. Notice that since the merged firm will adopt the technology of the more efficient party, L will always get zero payoff after entering the market if it is less efficient than firm 1. This leads to the question of L's incentive to conduct a zero NPV project. Although for simplicity I do not model any synergy gain from mergers. In reality, it is possible that the merged firm will be more efficient than either one of the two merger parties. In that case, as long as L can get some of the synergy gain from the merger, it is always better off by merging with firm 1. Sometimes even if there is no synergy

gain from the merger, a firm may still have incentive to enter the market. It could be that a foreign firm wants to merge with a U.S. firm in one line of its business just to open the U.S. market for many other businesses because a lot of the fixed investment such as distribution centers, marketing networks, office buildings, and administrative expenses can be shared among several segments. For example, when the Korean Electronics producer, LG Electronics, acquired Zenith to gain access to the North American TV market in 1995, it was actually technologically less efficient than Zenith. But by merging with Zenith, it benefited by establishing a distinct corporate image in the U.S. and associating itself with a bellwether name that helped its competition in markets worldwide.

Thus, in equilibrium, both efficiency types prefer to enter through a merger with firm 1 and avoid the fixed entry cost of F. But L will have to pay more to acquire firm 1 than does L.

Result 1 : *Under symmetric information, both type H and type L entrant will enter by taking over firm 1. H will bid* B^H *and L will bid* B^L *with* $B^L > B^H$.

Proof: see appendix A.1.

2.3.3 Asymmetric Information

When the efficiency type of the entrant is not known by the target, L always has the incentive to mimic H so that it can acquire firm 1 at a lower price. Since firm 1 cannot tell whether a potential entrant approaching it with the bid of B^H is of type H or L, it will decide whether to accept the offer by comparing the bid from an unknown type of firm 2 with the expected profit it will earn if it rejects the bid. If an offer is from L, that is, the low efficiency entrant, then firm 1 will not lose anything by rejecting the merger offer because L's efficiency is such that its post entry profit in a two-firm Cournot competition is not large enough to recover the fixed entry cost. However, if firm 1 rejects a bid from H, H will then enter the market directly and Firm 1's profit will be reduced to its share in the two-firm Cournot competition. Before the type of the entrant is revealed, firm 1's expected profit given potential direct entry of H is based upon its prior belief about the entrant's type:

$$E(\pi_1^E) = \frac{1}{2}(\pi_1^{E,H}) + (1 - \frac{1}{2})(\pi_1^{w/o}) \tag{2.1}$$

where $\pi_1^{E,H}$ is firm 1's profit in a two-firm Cournot competition with H and

$\pi_1^{w/o}$ is firm 1's current profit. Notice that the maximum bid H will be willing to pay is defined by:

$$\pi_2^{M,H} - B^H \geq \Pi_2^{E,H} \tag{2.2}$$

Equation 2.2 shows that the maximum bid H is willing to pay is the difference between $\pi_2^{M,H}$ and $\Pi_2^{E,H}$, which is the difference between what it will earn if it takes over firm 1 and what it will earn if it enters the market directly. This difference is an implicit function of the fixed entry cost and the competitiveness of the market which is measured by b. If the fixed entry cost is substantial or b is large, then H will be more willing to pay a high bid as long as its net payoff from the merger still out weighs its payoff after direct entry. On the other hand, the maximum bid L will be willing to pay is its post-merger profit because merging with firm 1 is the only option L has in order to enter the market.

It can be shown that firm 1's expected profit after rejecting the offer can be higher or lower than the maximum bid H could possibly offer depending on the value of b and F. If $\max(B^L) > E(\pi_1^E) > \max(B^H)$, firm 1 is better off by rejecting $\max(B^H)$. That is, H will not bid at a price that can possibly

be accepted by firm 1. Therefore, whenever an entrant offers to merge with firm 1, it must be L. Given that L cannot conceal its type by mimicking H under this circumstance, firm 1 will not accept any offer unless it is greater than or equal to what it is now making in the market. Therefore, a separating equilibrium exists where the incumbent will reject any offer less than B^L. So L bids for firm 1 and H enters directly. The type of the entrant is revealed through its equilibrium entry mode. A separating equilibrium may exist when the direct entry of H does not seriously hurt the profit of firm 1—for example, when b is small or the market is highly competitive. Alternatively, a separating equilibrium can be sustained when the fixed entry cost F is not large enough and takeover is less attractive to H than direct entry is. A low value of F leads to a very low $\max(B^H)$ which is less than $E(\pi_1^E)$, or what firm 1 expects to earn if it rejects the merger offer. Therefore, H would rather suffer from the fixed entry cost than from the cost of information asymmetry if the fixed entry cost is small or the level of competition is high.

When $E(\pi_1^E) < \max(B^H)$, the separating equilibrium is not sustainable. There exists a B^H which will be accepted by the incumbent. In fact, since firm 1 can not tell the type of entrant, firm 2 will offer a bid that leaves firm 1 just indifferent to accepting and rejecting the bid. Since firm 1's expected

profit will be $E(\pi_1^E)$ if it rejects the bid, it will accept any bid above $E(\pi_1^E)$ which is its reservation price. In this case, there exists a pooling equilibrium where both H and L bid for firm 1 with $E(\pi_1^E)$.

Result 2 : *When the type of the entrant is private information, there exists either a separating equilibrium or a pooling equilibrium depending on the level of b and F. Under the separating equilibrium, the low efficiency entrant will enter the market by taking over firm 1 while the high efficiency one will enter the market directly. Under the pooling equilibrium, both types of firm 2 will choose to enter by merging with firm 1 at its reservation price. be sustainable.*

Proof: see appendix A.2.

2.3.4 Extension

The equilibriums derived under asymmetric information are similar to those proposed in McCardle and Viswanathan (1994). However, by modeling the information asymmetry regarding the entrant's efficiency rather than its fixed entry cost, the model allows the strategic behaviors of other firms in the market to be endogenized. The response of other firms in the market will in turn have a feedback effect on the entry decision of the entrant. Notice that in reality there are usually more than one incumbent in a market. In that case,

the merger between one of the existing firms and the potential entrant will affect the profitability of all remaining firms in the industry. In some cases the pooling equilibrium that is sustainable given a single incumbent may be broken when there are more than one incumbent and when we take into account their strategic behavior in anticipation of the merger. When $C_2^S < C_2^B < C^I$ or $C_2^S < C^I < C_2^B$, the marginal cost of the merged firm is uncertain to other incumbents under the pooling equilibrium because the merged firm will adopt the efficiency of the bidder. Since firm 2's type is not revealed in the pooling equilibrium, other incumbents' output decisions are not based upon the true marginal cost of the merged firm but their belief of it. As a result, H's marginal cost is over estimated and L's is under estimated by other incumbents. This hurts the post-merger profit of H and makes merger less attractive than direct entry. When F or b is below a certain value, H will deviate from the pooling equilibrium and enter directly. So the set of F and b that can support the separating equilibrium is enlarged when there are more than one incumbent.

Result 3 : *When there are more than one incumbent in the market and when the type of the entrant is unknown to all incumbents, a pooling equilibrium may not be sustainable.*

Proof: see appendix A.3.

2.3.5 Empirical Implications

The model has important testable empirical implications on how asymmetric information affects both the mode of foreign direct investment and the target and the bidder stock performance around takeover announcements.

First, this model suggests that avoiding the high direct entry cost is an important factor in these merger and acquisition decisions. However, information asymmetry reduces the number of merger transactions in the sense that it impedes high efficiency entrants from takeovers under a separating equilibrium. Thus, fewer mergers should occur if the cost asymmetric information is larger than the fixed entry cost. According to those parameters in the model that determine whether a separating equilibrium is sustainable, we should observe fewer takeover transactions in industries that are more competitive and that involve lower direct entry costs.

Second, under asymmetric information, there exists a separating equilibrium where those firms that choose to enter an industry via mergers must be low efficiency entrants. Upon the takeover announcement, the market should revise its evaluation of the acquirer's efficiency and the impact of the entry on existing firms. Therefore, on the one hand, the stock price of the acquirer should drop because its low efficiency is revealed to its shareholders. On the

other hand, the target's stock price should respond favorably to the takeover announcement. This is because before the type of the entrant is revealed the existence of a potential direct entrant imposes a threat to future profits of existing firms. When the potential entrant announces that it will not enter directly but will instead take over an existing firm, the threat to all existing firms is resolved. Therefore, the merger announcement conveys favorable information about the target and other existing firms. It carries no such information, however, under the pooling equilibrium. Further, whether a separating or a pooling equilibrium can be achieved depends on the value of F and b. This implies that the negative and positive impact of the merger announcement on the acquiring and the target firms, respectively, should be stronger when the entry occurs in markets that are more competitive or have smaller entry costs. In other words, the differences in target and bidder wealth gains under symmetric versus asymmetric information should be more pronounced in those markets.

Since key elements of the model are the fixed entry cost and information asymmetry, this model provides a unique angle to examine cross-border mergers. A number of studies have examined the information asymmetry in the merger process(see Fishman(1989) and Eckbo, Giammarino and Heinkel

(1990)). Unlike previous research, here the information asymmetry is concerning the entrant's efficiency in the new market, which may not be the same as its efficiency in its current market. Compared with domestic cross-industry market entry, cross-border mergers and acquisitions are subject to more severe information asymmetry between targets and acquirers. This is exhibited by the well-documented "home bias": the strong preference for domestic securities by investors in international markets. Despite substantial diminishment of government restrictions on capital flows, foreign taxes, and other obstacles, the home bias has not disappeared. One important explanation for the home bias is the information asymmetry between domestic investors and foreign investors about the economic performance of domestic firms. Due to the information disadvantage of foreign investors, investors have strong preference for geographically proximate firms to which they have easy access. Kang and Stulz (1997) find that foreign investors hold disproportionately less of shares of firms that are highly levered, small, have low turnover and export less. They claim that this phenomenon may be the result of larger information asymmetry associated with these firms. Coval and Moskowitz (1999) even find evidence supportive of information-based explanations for local equity preference. The implication of the "home bias puzzle" on cross-border takeovers is that the

information differences between bidders and targets are magnified when foreign acquirers are involved. Even for those cross-border mergers which involve well-known multinational corporations from foreign countries, the fact that target company or investors can have easy access to information concerning their current efficiency does not necessarily imply that they have equally good knowledge about the foreign acquirers' future efficiency in the new markets. In fact, foreign acquirers' future efficiency may depend on how they are going to allocate resources among their multinational operations, how successfully they can realign their strategies to the new business, and many other firm specific factors that are beyond the scope of the target firm. Thus, tests about the role of asymmetric information in determining firms' entry decision can be conducted by comparing two different types of market entry: domestic cross-industry mergers versus cross-border mergers.

Specifically, when we examine cross-border mergers and acquisitions, the information asymmetry relates primarily to the future efficiency of foreign bidders in the domestic market because target firms already have a presence in the market. In this study my empirical analysis involves those cross-border deals in the U.S. market because unlike the U.S., many other countries around the world have government restrictions prohibiting majority ownership of do-

mestic companies by foreign acquirers in a number of industries. In that case, the choice between direct entry and merger is really limited.

2.4 Cross-industry Difference in Entry Modes

The empirical analysis focuses on two testable implications of the model. The first hypothesis concerns the cross-industry differences in the proportion of cross-border mergers in foreign direct investments and the second one concerns the differential shareholder wealth gains in domestic versus cross-border mergers. The first hypothesis states that:

Hypothesis 1 *Across different industries the proportion of cross-border mergers and acquisitions relative to the total foreign direct investments should be positively related to the entry barriers and negatively related to the competitiveness of each industry.*

One major difficulty in analyzing the determinants of the mode of entry into a new market is the lack of a comprehensive dataset on firms' direct entry. Data on domestic firms' direct entry into another industry is unfortunately not available. However, data about foreign direct entry into the U.S. market can be obtained although aggregate data is more comprehensive than

individual transaction level data. To examine the effect of industry characteristics on a firm's choice of entry mode, I obtain all complete foreign direct investment transaction data from the International Trade Commission of the U.S. Department of Commerce. Each year during 1987-1994, complete FDI transactions listings are arranged by primary SIC codes of the U.S. companies owned or controlled by foreign investors. The location of foreign investors is also available.

The International Trade Commission classifies all FDI into seven categories: Acquisition/Merger, Equity Increase, Joint Venture, New Plant, Plant Expansion, Real Estate and others. In this study, I restrict attention to only three categories (Acquisition/Merger, Joint Venture and New Plant) because the remaining categories (Plant Expansion, Equity Increase, Real Estate and others) do not represent new entry into a foreign market and therefore do not involve information asymmetry. Since detailed individual transaction level data is not available, analysis concerning the determinants of entry modes is performed at the industry level. Each year, each industry is required to have at least 5 transactions to be included in the analysis.

The industry characteristics used in the regression analysis of entry mode are obtained from Compustat. When calculating industry level charac-

teristics, I first calculate each variable at the individual firm level then derive the industry level measurement by calculating the median across all firms in each industry. Several previous studies (see Clarke, 1989; Lamont, 1997; and Scharfstein, 2000) show that the SIC classification is not successful in grouping firms based upon the economic markets they belong to. For example, according to SIC codes an oil-refining firm is in a different industry from an oil extraction firm, even if they are actually in related businesses. To alleviate this problem, I instead adopt the Fama and French (1997) 48 industry groupings. This grouping structure also allows me to obtain meaningful number of firms in each industry group. Since entry barriers can take various forms, I use several variables as proxies for an industry's fixed entry cost: R&D/Sales, Advertising/Sales, Selling Expenses/Sales, and Capital Expenditure/PPE. First, since research and development expenses can be a substantial portion of fixed costs and can create entry barrier through patents, it is relatively hard for a foreign firm to enter industries that engage heavily in R&D. Second, a high level of product differentiation also represents entry barriers because it gives established firms an advantage over future entrants. Therefore, advertising and selling expenses can help explain the fixed entry cost. Third, large amount of capital expenditure can deter firms from entering a market especially when

the entrant is not a deep-pocket one. Note that these variables are not equally important measures for each industry. For example, R&D would be more important for pharmaceutical companies while advertising or selling expenses, on the other hand, would proxy the entry barrier better for the beverage industry or those industries where brand names are important.

According to the model's prediction, the less competitive the market is, the more seriously direct entry by other firms will hurt existing firms and therefore the more likely target firms will accept merger offers. Thus, the proportion of mergers over all FDI activities in each industry should be decreasing with the level of competition. Since it is often believed that the more an industry is concentrated, the less competitive it is, I thus use the Herfindahl index as the proxy for the level of competition. Each year I calculate a sales-based Herfindahl Index for each industry as the following:

$$\text{Herfindahl}=\sum_{i=1}^{n} S_i^2$$

where S_i is firm i's share of total industry sales.

Panel A of Table 1 shows the distribution of foreign direct investment in the U.S. during 1987 and 1994. The importance of cross-border mergers and acquisitions as a form of foreign firms' entry strategy is clearly illustrated

in that they continuously account for more than 53% of the overall foreign direct investment during the sample period. Panel B provides the Pearson correlation matrix for those variables that proxy for the fixed entry cost and the level of competition. Not surprisingly, R&D expenses have a correlation of as high as 0.606 with selling expenses because according to Compustat for some companies R&D expenses are included in selling expenses.

Table 2 tests the model's predictions about the determinants of entry modes across different industries. According to the model, the proportion of mergers in foreign direct investment should be positively related to proxies for entry barriers and negatively related to the competitiveness of each industry.

For each year from 1987 to 1994 and for each industry, I calculate the ratio of the total number of mergers and acquisitions relative to the total number of direct entry. I regress the log of this ratio on previous year's measures of the fixed entry cost and the level of competition and several control variables. To account for the potential autocorrelation of merger activities across different years and the heteroskedasticity across different industries, t-statistics of the coefficients are calculated based upon the Newey-West autocorrelation and heteroskedasticity consistent standard errors.

In Table 2, R&D/Sales, Advertising/Sales, Selling Expenses/Sales, and Capital Expenditure/PPE are used to measure the fixed entry cost while sales based Herfindahl index proxies for the level of competition. Since these four proxies for the fixed entry cost are likely to capture different aspects of entry barriers in different industries, I run regressions with each proxy separately and with all proxies included. When including all proxies in one regression, I leave out selling expenses because they are highly correlated with R&D expenses. It has been observed that mergers in the drug, chemical, auto, oil, and electronics industries are strongly driven by technological reasons. For example, a technologically superior foreign company may exploit its advantage by expanding into another market. Alternatively, a technologically inferior company may attempt to obtain advanced technology by acquiring another company to remain viable in the global market. Therefore, I assign a dummy variable to each of these five industries to control for the possibility that it is the technological shocks, rather than the fixed entry cost or the level of competition, that may be driving the results. Another confounding factor is the existence of merger clustering during the sample period. Due to these merger waves, changes in the ratio of mergers to direct entry over years may merely capture merger activities in general rather than variations in fixed entry costs

or industry concentration. This possibility is illustrated in Figure C.1, where the ratio of mergers to other forms of foreign direct investment appears to be moving together with the change in overall merger and acquisition activities. To account for the potential impact of merger waves, I assign a year dummy to each industry year.

As shown in Table 2, the ratio of mergers to direct entry is positively related to those variables that proxy for fixed entry costs (R&D/Sales, Advertising/Sales, Selling Expenses/Sales, and Capital Expenditure/PPE). Among these four proxies, the frequency of mergers as the mode of entry seems to be most sensitive to the advertising expenses. This suggests that customer loyalty can be an important form of entry barrier in many industries. As predicted by the model, the frequency of mergers is decreasing with the competitiveness of the market indirectly measured by the Herfindahl Index. When putting R&D/Sales, Advertising/Sales, Capital Expenditure/PPE and the Herfindahl Index together in one regression, most of them remain significant. Therefore, the findings in Table 2 provide strong support to the role of industry characteristics in determining foreign firms' entry mode.

Since the dependent variable is a truncated variable, I use a probit regression to re-examine the relation between entry modes and industry char-

acteristics in Table 3. In the probit model, the dependent variable is replaced by the proportion of mergers in total foreign direct investment. As can been seen in Table 3, the results obtained in Table 2 are not sensitive to different model specifications.

Though not shown in the paper, I also repeat Table 2 and Table 3 with the total dollar value of mergers relative to the total dollar value of foreign direct investments to make sure that the cross-border merger is indeed an economically significant mode of foreign entry. The results are not materially different. In summary, foreign firms' entry strategies are strongly influenced by industry characteristics such as the fixed entry cost and the level of competition.

2.5 Empirical Analysis on Announcement Abnormal Returns

Although the last section provides evidence in support of the prediction regarding the cross-industry differences in the mode of entry of foreign investors, the result can potentially be consistent with other explanations. Suppose in absence of asymmetric information, there is a unique cost associated with

merger, for instance, the friction between target and bidder managements, firms are still more likely to enter a new market directly when the fixed entry cost is small relative to the cost of merger. Therefore, it is not totally clear how important asymmetric information is in affecting firms' equilibrium entry strategy. To further examine the role of asymmetric information, I test the second hypothesis regarding the information content of merger announcements under asymmetric information:

Hypothesis 2 *Compared with domestic cross-industry mergers and acquisitions, acquirers(targets) in cross-border deals should experience larger wealth losses(gains). The differences are more prominent when acquirers are entering those industries that are more competitive or have smaller fixed entry costs.*

To conduct analysis on the implication of the this hypothesis, I examine the wealth effect of merger announcements on bidders and targets in domestic versus cross-border deals. For the period of 1981 to 1998 I obtain all complete and public disclosed value mergers and acquisitions from the SDC Mergers and Acquisitions database. Some deals are dropped because an acquirer announced multiple acquisitions or a firm was recorded as the target in multiple deals on the same day. I make two further requirements on deal values and bidders' ownership of the combined firms because inclusion of small deals only adds

noise to the analysis. Thus, each deal must have a transaction value of at least $1 million and the bidder must control at least 40% of the post merger firm to be included in the analysis. In order to calculate announcement abnormal returns, targets and bidders are also required to be publicly traded companies with stock return data available from CRSP or Datastream International. The market index return employed is the CRSP equally-weighted index for the U.S. market and Datastream Country Index return for other countries. Returns denoted in foreign currency are converted into U.S. dollars. I exclude those transactions where targets are in either public utility or financial industries.

Table 4 provides an overview of the time series and geographic distribution of the merger activities included in the announcement abnormal return analysis. Consistent with previous evidences concerning merger activities in the U.S., the table indicates two major merger waves in the past two decades. One ran from 1983 to 1989 and the other one from 1994 to 1998. This observation confirms the importance of controlling for merger clustering when examining any changes in the number of mergers and acquisitions over time in the previous section. Another feature of the sample is that there is a slightly higher portion of within industry mergers and acquisitions than cross industry deals in both domestic and cross-border samples during most of the years

according to the Fama-French 48 industry groups that targets and bidders belong to. Not surprisingly, the country breakdown shows that Japan, UK and Canada are three major foreign players in the U.S. merger and acquisition market, which together account for more than 55% of all the cross-border takeovers.

Since this study seeks to explain how asymmetric information affects the equilibrium mode by which a firm enters a new market and the signaling effect of the entry mode, I focus on the comparison between two types of entries: domestic entry into another industry and cross-border entry into another country (whether within or across industries). A comparison of deal characteristics for these two types of mergers is presented in Table 5. Two related features of cross-border deals are apparent. First, significantly more cross-borders deals than domestic cross-industry deals use cash as the only means of payment. Second, more foreign bidders obtain corporate control through tender offers. However, with the rapid globalization in the 1990s and the growing acceptance of foreign firms' stocks by U.S. investors, the proportion of cross-border deals paid with cash decreases over time. At the same time, the soaring U.S. stock market also encouraged the use of stock as a method of payment in both domestic and cross-border transaction in the 1990s. Another

factor behind this change in the method of payment is the Tax Act of 1986 which provided acquiring firms with less incentive to make cash offers. There is no significant difference in the proportion of resisted offers or offers involving multiple bidders between domestic and cross-border mergers.

2.5.1 Unconditional Abnormal Returns

According to the model's predictions, the bidders are revealed to have low efficiency through the takeover announcement. Thus, the bidder should experience a negative stock response. On the other hand, the merger announcement appears to be good news for the target firm because the entrant will enter via takeover and the threat of direct entry to its current profitability is resolved. As a result, target shareholders should experience wealth gains. One way to test this hypothesis is to compare wealth effects of mergers on target and bidder shareholders in domestic cross-industry mergers versus cross-border mergers because the latter involves more severe information asymmetry.

To assess these wealth effects, I calculate the abnormal return around the merger announcement dates. For each announcement date, I calculate the

abnormal returns for company i using the market model:

$$AR_{it} = R_{it} - \exp(R_{it}) = R_{it} - \widehat{\alpha}_i - \widehat{\beta}_i * R_{mt}$$

where R_{mt} is the market index. $\widehat{\alpha}_i$ and $\widehat{\beta}_i$ are estimated using daily stock returns of company i during the period of (-240, -41) before the takeover announcement. For a 7-day event window (-3, +3) around the announcement day, I calculate the cumulative abnormal returns by:

$$CAR_i = \sum_{t=-3}^{t=3} AR_{it} = \sum_{t=-3}^{t=3} R_{it} - \widehat{\alpha}_i - \widehat{\beta}_i * R_{mt}$$

Panel A of Table 6 shows the abnormal returns on the target company stocks during the period of 3 days before and 3 days after the merger announcement and the 7-day cumulative abnormal returns around the event day. Consistent with the model's prediction, around the event day, the average abnormal returns for targets in cross-border mergers are significantly larger than those for targets in domestic mergers. In fact, on the announcement day itself, the takeover premium earned by target companies of foreign buyers is significantly larger than that earned by targets of domestic buyers by more than 3%. The 7-day cumulative abnormal returns also support the hypothesis that

target shareholder wealth gains are higher when buyers are foreign companies. Across the 7 days, targets of foreign companies earn almost 5% more than targets of domestic firms in a different industry.

To test whether differences in wealth gains (losses) to acquiring firms in domestic and foreign acquisitions are also consistent with the model's prediction, I calculate daily abnormal returns of bidders for the same event window of (-3, +3). The results are shown in panel B. Consistent with previous evidences, acquiring firms' abnormal returns are much smaller than those of the target firms. More importantly, foreign bidders' wealth gains are close to zero while domestic bidders earn significantly positive, though small, abnormal returns upon takeover announcements. This finding is also in line with the Eckbo and Thorburn (2000) evidence from takeovers of Canadian firms in which domestic bidders earn significantly positive average announcement abnormal returns, but foreign (U.S.) bidders' abnormal returns are indistinguishable from zero.

2.5.2 Conditional Abnormal Returns

The abnormal returns calculated in the previous section are unconditional. Previous studies suggest that deal characteristics can influence these returns. Since Table 5 indicates that domestic and cross-border mergers have signifi-

cantly different characteristics, I run the following Weighted Least Square(WLS) regression to determine whether different degrees of information asymmetry or other factors are explaining the differences in abnormal returns between the cross-border and domestic mergers:

$$CAR_{i(-3,3)} = a_0 + \alpha_1 * Cross-border + \alpha_2 * Cross-ind + \alpha_3 * Cash + \alpha_4 * Hostile + \alpha_5 * Compete + \alpha_6 * Take100\% + \alpha_7 * Cross * FX + a_8 * Cross * Stock + a_9 * \mathrm{Si}\,ze + a_{10} * Tax81 + a_{11} * WWtax + a_{12} * Advisor$$

To control for potential heteroskedasticity, weights in the regressions are equal to the standard deviation of the market model residuals. CAR is the bidder or target cumulative abnormal return for the event window of (-3, +3). *Cross-border, Cross-ind, Cash, Hostile* and *Compete* are dummy variables set to 1 for deals that are cross-border, cross-industry, pure cash offers, hostile takeovers, or involve more than one bidder respectively. *Take100%* is a dummy variable indicating whether the acquirer controls 100% of the target after mergers. *Cross*FX* is defined as the interaction between the cross-border dummy and the quarterly percentage deviation of the U.S. real trade-weighted average dollar exchange rate index from its average in the sample period. It is matched to each deal according to the deal announcement date.[5] *Cross*Stock*

[5]The dollar exchange rate index used here is the real trade-weighted average of foreign exchange values of the U.S. dollars against major currencies released by the Fedeal Reserve Board. An increase in this value indicates dollar appreciation.

is a binary variable used to indicate those foreign mergers completed partially or entirely with stocks. Size measures the relative sizes of the deal and the bidding firm with the logged ratio of the deal value to the bidding firm's market capitalization as of three months before the merger announcement. Tax81 and WWtax are dummy variables indicating whether the takeover occurred during 1981 and 1986 when the 1981 Economic Recovery Tax Act was in effect and whether the foreign buyers were from either U.K. or Japan during that period. Since U.K. and Japan are Worldwide tax regime countries with different corporate tax rates than the U.S., WWtax can help identify whether the 1981 ERTA gave U.S. buyers any advantage over foreign buyers from the Worldwide tax regime. Finally, Advisor indicates those transactions where the target firm has a top investment bank as its financial advisor.[6]

Recently a large literature has documented that diversified firms are valued at a discount relative to comparable portfolios of stand-alone firms. Potential explanations include managerial agency problem, cross subsidization, and mispricing by investors (see Morck, Shleifer, and Vishny, 1990; Scharf-

[6]Although the reputation of investment banks is a subjective issue, the ranking of top investment banks is actually quite stable given the rigid hierarchy in this industry. Top investment banks include Salomon Smith Barney, Merrill Lynch, Merrill Lynch Capital Management, J.P. Morgan, Credit Suisse First Boston, Morgan Stanley, Goldman Sachs, Lehman Brothers, Bear Sterns & Co., Deutsche Bank AG, UBS and Paine Webber or their predecessors before consolidations according to the Bloomberg Underwriter Rankings for U.S. corporate deals in recent years.

stein,1998; Rajan, Servaes, and Zingales, 2000; Lamont and Polk, 2000). It is possible that some bidders experience lower wealth gains than others because they are conducting a diversifying merger. Although this is unlikely to be driving the result here because the domestic sample includes cross-industry deals only while the foreign sample contains both within industry and cross-industry deals, I still include a dummy for all cross-industry deals. Again, in the regression analysis I adopt the Fama-French 48 industry classification when determining whether a deal is cross industry or not.

Huang and Walking (1987) and Travlos (1987) suggest that the method of payment has a very powerful influence on the takeover premium. Specifically, cash offers generally bring higher abnormal returns than do stock offers to both the targets and the bidding firms. Since Table 5 shows that a significantly larger portion of cross-border deals than domestic deals are cash offers, the *Cash* dummy is included to control for the possibility that the higher abnormal returns earned by the targets of foreign buyers are driven by the fact that more cross-border deals are completed through cash offers. Huang and Walking (1987) also find that managerial resistance can bring higher target takeover premium although the results are not statistically significant. Dewenter (1995) provides weak evidence that managerial efforts to delay or

block the bid can raise the target takeover premium. Table 5 does not show a significant difference between percentages of hostile takeovers in the domestic versus the foreign deals. However, the characteristic of the hostile takeovers may differ across the two sub-samples. Thus, I include the *Hostile* dummy to allow for a difference. Bradley, Desai and Kim (1988) find that cumulative abnormal returns are higher for targets and lower for bidders when there are rival bidders. I thus include a dummy for deals with competing bids because Table 5 shows that significantly more cross-border mergers are contested than domestic mergers in the 1980s. A dummy variable *Take100%* indicating full takeovers is also added since Dewenter (1995) finds that target takeover premium is higher when the bidder acquires 100% ownership of the target, .

Foreign bidders are able to pay more when exchange rates move to their advantage. As a result, the depreciation of the dollar facilitates takeovers of U.S. firms by foreign bidders. Since the 1980s are characterized by dramatic movements of the dollar, the variable *Cross*FX* is added to control for the effect of exchange rate on the takeover premium. When analyzing the differences in bidding firms's stock returns, I include an additional interaction term between the cross-border dummy and the dummy variable indicating whether stocks are used for part of or all of the purchase. Although current litera-

ture on domestic mergers suggests that a takeover through equity signals that the bidding firm is overvalued, the information content of a stock offer could be different when the bidder is a foreign company because it is required to disclose more information if its equity is involved. In fact, the willingness of the target shareholders to accept the foreign bidder's stocks sends a strong positive message to the market about the bidders. Therefore, the expected sign on *Cross*Stock* is positive. Jarrell and Poulsen (1989) find that acquirer abnormal returns decrease with the size of the acquirer relative to that of the target. Eckbo and Thorburn (2000) also provide evidence that the smaller size of the Canadian bidders helps explain their superior performance compared with that of U.S. acquirers. Therefore, I include the logged ratio of the deal value relative to the size of the acquirer to capture the attenuation effect.

Given U.S. tax law changes during the sample period and their consequences on acquisitions across time and across acquirers from different countries, *Tax81* and *WWtax* are two dummy variables used to control for the effect of taxes on takeover premiums. Measures such as accelerated depreciation and investment tax credit under the 1981 Economic Recovery Tax Act made mergers more attractive to firms. Therefore, *Tax81* takes on the value of one if a deal is announced between 1981 and 1986. However, whether the differential

corporate tax rates between the U.S. and foreign countries can affect the relative level of takeover premia received by targets of foreign versus domestic buyers depends on whether foreign buyers are from Worldwide Tax countries where repatriated earnings are taxed at home.[7] According to the Scholes and Wolfson (1990) tax story, the 1981 Tax Act should have favored U.S. buyers against foreign buyers from the Worldwide tax regime. Therefore, *WWtax* is expected to be negative if tax incentives are linked to takeover premiums.

One unique role of financial advisors is the reduction of information asymmetry in the merger process. We expect the information asymmetry problem to be less severe if target firms get advice from top investment banks. However, the sign on the dummy variable Advisor is unclear because experienced financial advisors can also help target firms reap more gains from the transaction at the cost of acquiring firms.

As can be seen from Table 7, after controlling for these potentially confounding factors from the deal characteristics, targets of foreign buyers on average still earn significantly larger takeover premiums than do targets of domestic buyers–a result that is supportive of the effect of increased information asymmetry in cross-border mergers. Although stock prices seem to

[7]See Scholes and Wolfson (1990) and Dewenter (1995) for more detailed discussion on the differential tax consequences of the 1981 Economic Recovery Tax Act on U.S. and foreign firms.

react more negatively to acquiring firms engaging in cross-industry mergers, the cross-industry dummy is not significant. I also find that average cumulative abnormal returns to targets are higher in all-cash and in hostile takeovers and when acquirers hold 100% ownership of the combined firms. These results are consistent with Jensen and Ruback (1983), Huang and Walking (1987), Servaes (1991) and several other studies on domestic mergers. Surprisingly, targets earn significantly less in mergers with rival bidders. This contradicts evidences in studies on domestic mergers such as Bradley, Desai, and Kim (1998) but concurs with one of the most puzzling results in the Dewenter (1995) study of market reactions to domestic and foreign takeover announcements in U.S. chemical and retail industries. Consistent with Harris and Ravenscraft (1991), I find that the strength of foreign currencies relative to the U.S. dollar significantly affects the takeover premium earned by targets of foreign bidders.

On the other hand, in addition to differences in bidder gains that can be attributed to differences in deal characteristics, foreign bidders appear to experience significantly larger wealth losses around merger announcement dates than do domestic bidders. Unlike the target takeover premium, abnormal returns to bidders do not seem to be significantly related to either the existence of rival bidders or the acquirers' ownership of the merged firm. The negative

sign on *Hostile* is consistent with the view that target firms gain in hostile takeovers at the expense of acquirers. Similarly, while *Take100%* is significantly positive in the target regression, it takes on a significantly negative sign in the bidder regression.

Interestingly, however, foreign bidders that pay part of or the entirety of the transactions with their equity appear to experience 1.48% larger wealth gains. This observation is in sharp contrast to previous evidence of cash premium in domestic mergers.[8] It suggests that the method of payment has a unique signalling effect in cross-border mergers. On the one hand, the acceptance of foreign stocks by U.S. targets serves as a positive signal about the value of foreign bidders. On the other hand, companies that use equity to complete the merger are forced to disclose more information and are subject to more stringent regulatory scrutiny. Therefore, the asymmetric information associated with these firms will be less severe. In that case, since the merger announcement is a less negative signal about the them, they should realize larger wealth gains.

Although the significantly positive sign on *Size* suggests that the impact of the merger on acquirers tends to be more pronounced when the acquired

[8]Eckbo and Thorburn (2000) also find that Canadian bidder announcement returns are on average greatest for offers involving equity payment. But their finding is specific to domestic mergers in the Canadian corporate control market.

assets are more significant relative to their premerger assets, the magnitude of the coefficient is rather small and cannot fully account for differences in wealth gains realized by domestic versus foreign bidders. Again, consistent with Harris and Ravenscraft (1991) and Dewenter (1995), I do not find tax incentives to have any explanatory power on the takeover premium. Rather, the negative coefficient on *Tax81* in the target and bidder regressions may merely reflect the lower premium earned by firms in general in the 1980's relative to the 1990's.[9] Finally, there is no clear evidence that the reputation of the target firm's financial advisor is related to the level of information asymmetry in the merger process.

2.6 Effects of Industry Characteristics on the Differences in Abnormal Returns

In the previous section, I provide evidence that significant differences exist between domestic and cross-border deals in terms of target and bidder takeover wealth gains. However, it is hard to conclusively claim that these differences are due to asymmetric information because asymmetric information results in

[9]Replacing the Tax81 dummy by a dummy variable indicating deals taking place in the 1980's also yields significantly negative sign.

the separating equilibrium only if the fixed entry cost is not too high or the market is very competitive. This is because the smaller the fixed entry cost is, the less attractive merger is to the high efficiency entrants. They are then less willing to pool with the low efficiency entrants. Similarly, the more competitive the market is, the less likely the target is to take the risk of accepting a low bid from a potential low efficiency entrant. Thus, merger offers from high efficiency bidders have a larger likelihood of being rejected. This suggests that the differences in target and bidder takeover premium between domestic and cross-border mergers should be more pronounced when the bidding firm is entering an industry that is highly competitive or has relatively small fixed entry cost. In order to show that it is asymmetric information that is driving the differences documented in last section, I further investigate the cause of these differences by examining the cross-sectional determinants of the impact of asymmetric information on differential announcement abnormal returns in domestic versus cross-border mergers.

As discussed in section **??**, I use the industry R&D expenditure to proxy for the fixed entry cost and the Herfindahl index to proxy for the competitiveness of the market. Previous year's industry median R&D/Sales and Herfindahl index are matched to each deal according to the Fama-French 48

industry groups that the target firm belongs to and the deal date. Acquisitions in industries where the R&D/Sales is below the median level of all industries in the sample are classified as entries into markets with low fixed entry cost. According to the guidelines issued by U.S. Department of Justice for evaluating mergers, acquisitions in industries with Herfindahl index less than 0.18 are considered as entries into relatively competitive markets.

In Table 8, deals are divided into two groups by the level of entry cost and market competition. The coefficient on the cross-border dummy indicates that differences in target and bidder abnormal returns between domestic and cross-border mergers become more significant when mergers take place in markets with relatively low level of fixed entry cost or high level of competition. Specifically, for those deals with target industry R&D/Sales below the median level or with Herfindahl index smaller than 0.18, targets of foreign buyers earn 7.66% more than do targets of domestic buyers. On the other hand, foreign buyers lose 1.77% more. However, when entrants are entering industries with high fixed entry cost or low level of competition, the differences are much smaller and no longer significant. This evidence is consistent with the model's prediction about the source of differences in announcement abnormal returns between domestic and cross-border mergers. It provides strong support for the

hypothesis that asymmetric information and fixed entry cost together determine foreign firms' mode of entry and the resulting differences in wealth effects between these two types of mergers. More importantly, the cross-sectional variation in the differences between domestic and foreign takeover premiums clearly distinguish the information asymmetry hypothesis from other alternative explanations.

The cross-industry analysis and event study provided in the above two chapters suggest that the differences between domestic and cross-border takeovers in terms of targets and bidders wealth gains can be explained by the information asymmetry involved in cross-border transactions. Due to information asymmetry, high quality firms must pay a premium relative to their offer prices under symmetric information if they want to enter by taking over existing firms and avoid the fixed entry cost associated with greenfield investments. They will do that only when the entry barrier is too costly. On the other hand, existing firms, being the uninformed party, want to protect themselves by asking for a high takeover price. But at the same time they are also running the risk of rejecting high quality bidders. The lower is the level of competition in the market, the more severely existing firms will be hurt by the direct entry of high quality firms. Therefore, first, merger is more likely

to be the mode of entry when the fixed entry cost is high and when the level of competition in an industry is low. Second, differences in target and bidder takeover premium between cross-border and domestic mergers come from those deals in industries with low fixed entry cost or low level of competition.

2.7 Evidence from Related Mergers

In both domestic and cross-border mergers, many involve cross-industry combinations according to the primary SIC codes of the targets and bidders. Theoretically, the model's implication applies to both related and conglomerate mergers. Empirically, when a firm is entering a market that is unrelated to its current business, it is unlikely that it has the capacity to establish its own business in the new market. In other words, the choice between direct entry and takeover is very limited in that case. If this is true, then there is actually less uncertainty about the mode of entry or the efficiency of entrant. To conduct a test that best illustrates how asymmetric information causes the market to react to domestic and cross-border mergers differently, in this section I restrict the sample to related mergers.

Examining a sub-sample of related mergers also allows for more powerful tests on the effect of asymmetric information. Since cross-industry mergers

and cross-border mergers are two different types of market entry, it is hard to quantify which one involves more severe information asymmetry because the cross-border merger sample consists of both within industry and cross-industry deals. However, by examining domestic and cross-border related mergers only, I resolve the problem regarding the relative importance of information asymmetry in cross-industry and cross-border takeovers.

Although in the previous regressions I have controlled for the effect of diversifying mergers by including a cross-industry dummy, one can still argue that the results are entangled with the "diversification discount" because comparing the primary industry groups that the targets and acquirers belong to cannot identify related businesses represented by different segments of the firms. Although the domestic sample includes more deals between targets and bidders from different industries according to their primary business segments, it is possible that the cross-border sample actually has more diversifying mergers if we examine all of firms' business segments rather than just their core segments. If that were the case, one would also expect to see lower bidder abnormal returns in cross-border deals. Thus, restricting the analysis to related mergers also help disentangle the diversification discount from the effect of asymmetric information.

Therefore, in this section I remove the conglomerate mergers from my sample and conduct a separate analysis on related mergers. Following Chavelier (2000), I pull out all reported four-digit SIC codes of both acquirers and targets in each deal and convert them to the Fama-French 48 industry groupings.[10] I then define a diversifying merger as one in which the bidder has no business segments in common with the primary business of the target at the Fama-French 48 industry level. Since I am examining non-diversifying mergers that represent entry into another market, for domestic mergers I only include those that involve parties with different primary business segments but are not classified as diversifying mergers. This screening procedure on relatedness is performed for both domestic and cross-border deals.

Tables 9 and 10 repeat the analyses in section 2.5 for related mergers only. Regarding wealth effects of mergers on targets and acquirers, the results are consistent with those involving the full sample. Compared with domestic mergers, targets in cross-border deals experience higher abnormal returns while foreign bidders suffer larger wealth loss after controlling for deal characteristics, exchange rate movement and different tax regimes. Again, these differences are mainly driven by those deals where the bidders enter markets with low

[10]SDC reports up to 10 SIC codes for each multi-segment firm.

fixed entry cost and high level of competition. Although the magnitude of the coefficient on the cross-border dummy is slightly smaller in the target abnormal returns regression and slightly larger in the bidder regression, the results shown in Tables 6 through 8 are not qualitatively different if conglomerate mergers are excluded.

2.8 Effects of Varying Degrees of Information Asymmetry

2.8.1 Industry Analysis

In chapters 2.5 and 2.7, I compare domestic deals with cross-border ones because cross-border mergers are generally conducted in an environment characterized by more severe information asymmetry between buyers and targets. However, depending on where the merger transaction takes place, the level of information asymmetry should be different across product markets. For example, we expect the production of consumer goods to be fairly standard around the world and the information asymmetry to be a less important problem in mergers involving those products. In contrast, the difference in information asymmetry between domestic and cross-border mergers will be much more sig-

nificant in hi-tech industries because the nature of the business making it more difficult to assert a firm's potential profitability in a new market. Therefore, it will be interesting to examine if the differences in takeover premiums between domestic and cross-border mergers vary with the degree of information asymmetry.

In Table 11, I focus on the sub-sample of mergers where the target's primary business falls into any of the following industries: medical equipment, drugs, chemicals, electrical equipment, automobiles, aerospace, telecommunication, computers, chips and the software industries. Since mergers in these markets should feature more severe information asymmetry, we should expect to see larger differences in takeover premium between domestic and cross-border mergers. One complication of this analysis is that these industries are usually associated with high entry barriers as well since they are businesses with high R&D and selling expenses. This means the overall differences in takeover premiums as a result of information asymmetry should be less prominent in this sub-sample. To better illustrate the effect of information asymmetry, I again group the sample into two categories according to the level of entry cost and market competition in the target market.

Similar to what I find in Table 8, the cross-border dummy is signifi-

cantly positive in the target regression and significantly negative in the bidder regression for mergers that take place in industries with low R&D expenses and high level of competition. Furthermore, the differences in target and bidder takeover premium between domestic and foreign mergers are much larger for this sub-sample of mergers that are more likely to involve the information asymmetry problem. When the fixed entry cost is low and the market is highly competitive, targets of foreign buyers realize 16.25% more wealth gains while foreign buyers earn 3.45% less after I control for all other confounding factors from deal characteristics, potential attenuation effect, exchange rate and tax effects. These differences in takeover premium are almost twice as much as the numbers that are obtained from the full sample. They provide support for the information asymmetry explanation for differential target and bidder wealth gains in domestic and cross-border mergers.

2.8.2 Country Analysis

To provide further insight into the role of asymmetric information, I now conduct a separate analysis on cross-border mergers. Even among foreign deals themselves, there should still exist different degrees of information asymmetry depending on the bidder's domicile market. For example, if a U.S. target firm

is negotiating a deal with a Canadian firm, given the small differences between the two countries, the target firm will most likely treat the offer the same as it would treat an offer from an otherwise identical U.S. firm. On the other hand, if the bidder is a firm from a country such as Singapore, which is culturally very different from the U.S., has different accounting standards and does not have such close business ties with the U.S. market, then the value of the bidder would be less transparent to the target. Therefore, if information asymmetry is driving the differences in target and bidder wealth gains, one should expect to see its effects vary across deals involving bidders from different foreign countries.

As a robustness check, in this section I examine the effects of different degrees of the information asymmetry on target and bidder wealth gains by focusing on cross-border mergers. Table 12 regresses the cumulative 7-day announcement abnormal returns for targets and bidders against a country group dummy and other controlling variables used in previous analyses. Unlike analyses in chapters 2.5 and 2.7, the foreign exchange movement and the dummy variable indicating equity offers are not interacted with the cross-border dummy because only foreign mergers are included here. I classify all cross-border deals into two categories: one in which the bidding firms are from

either Canada or UK and the other one involving bidders from the rest of the world. The "Other Countries" dummy is set equal to one for those deals where the bidders are not from those two countries which have the smallest economic and cultural differences from the U.S. As expected, the effect of information asymmetry is more significant when bidders are from other countries. This is reflected by the significantly positive coefficient on the "Other Countries" dummy in the target abnormal returns regression and the significantly negative coefficient on it in the bidder regression. The results in Table 12 suggest that compared with deals involving UK or Canada, targets in deals involving other foreign countries that are less integrated with the U.S. market experience larger wealth gains while bidders in those deals suffer larger wealth losses due to the higher degree of information asymmetry involved.

2.9 Summary of Chapter 2

In this study, I examine the differences between domestic and cross-border merger and acquisition from a new perspective. Some previous evidences document that the stock market reacts to domestic and cross-border mergers differently. These differences cannot be explained by differences in either deal characteristics, or the impact of exchange rate movement, or tax law changes.

Other studies, however, provide evidence that the "foreign premium" received by U.S. targets does not hold uniformly across all industries.

Compared with domestic deals, cross-border transactions generally involve greater asymmetric information between targets and acquirers. To focus on this feature, I motivate my empirical analysis with a model that characterizes the effect of information asymmetry regarding the bidders' efficiency on their entry decisions. Given a fixed entry cost associated with direct entry, entrants should always choose to merge with an existing firm regardless of their efficiency types in absence of asymmetric information. However, when the type of the entrant is unknown to the target firm, the high efficiency bidder enters directly while the low efficiency one enters via a merger if the fixed entry cost is below a certain level or if the market is very competitive. In equilibrium, the takeover announcement conveys favorable information about the existing firm and unfavorable information about the bidder in the presence of asymmetric information.

Assuming more severe information asymmetry exists in cross-border mergers, I examine when foreign firms choose to enter the U.S. market through cross-border mergers and compare the wealth effect of cross-border mergers with that of domestic ones. Using a dataset of foreign direct investment in

the U.S., I find that acquisitions will more likely be foreign firms' entry mode into those industries that are less competitive or involve higher fixed entry cost. To investigate whether the market reacts to domestic and cross-border mergers differently due to the different degrees of information asymmetry, I calculate takeover premia to targets and bidders in two types of market entry: domestic cross-industry deals and cross-border deals. First, I find that in cross-border mergers the target earn significantly higher premium and the bidder earn significantly lower premiums around the announcement period as compared to domestic deals. Furthermore, I find that these differences in announcement abnormal returns are mainly driven by those deals that represent entries into industries with low level of fixed entry cost and high level of competition, a result that is in support of the information asymmetry hypothesis. Restricting the sample to related mergers does not change the results. Finally, I show that the announcement abnormal returns for targets and bidders vary across industries and foreign countries with differing degrees of information asymmetry in a way that provides further support to the impact of asymmetry information.

Chapter 3

Explaining the Foreign Exchange Exposure of U.S. Firms

3.1 Introduction to Chapter 3

The increasing globalization of product and financial markets means that many firms are now exposed to changes in the values of currencies. These changes can have a dramatic effect over a short period of time. For example, in the fall of 1999, Sony announced that its profits were down 25% because the appreciation

of the yen affected their foreign sales (Landers, 1999). More recently, the fall of Xerox's credit rating from investment grade to speculative grade restricted its access to credit and its ability to hedge foreign exchange risk, resulting in larger losses than expected for 2001. A firm's exchange rate exposure can come from direct exposure, such as that faced by Sony and Xerox in their foreign sales, or it can come from indirect exposure, such as when a firm has a foreign competitor. Even a firm with only domestic competitors and no foreign operations or sales could be subject to foreign exchange exposure if a party with which it has a business relationship, say, its supplier, is exposed to exchange rate risk.

Despite this complexity, financial economists have attempted for some time to measure the extent of corporate exposure to exchange rate changes. Currently, most theoretical examinations of the currency risk have focused on the impact of exchange rate fluctuation on firm's cash flow volatility. (See, for example, Smith and Stulz, 1985; Stulz, 1984; and Froot, Sharfstein, and Stein, 1993.) Because it is difficult to observe a firm's cash flows, following Adler and Dumas (1984), the standard empirical research design has become estimating currency exposure by regressing stock returns on the percentage change in exchange rates. However, by taking this approach so far empirical

studies have found very low proportion of U.S. firms having significant exposure. (See, for example, Jorion, 1990; Bodnar and Gentry, 1993; and Amihud, 1994; Griffin and Stulz, 2001.) Therefore, despite the widely expected impact of currency exposure on firms' operations, the correlations between contemporaneous exchange rate movements and the firms' stock returns appear to be very low.

Motivated by previous theoretical studies of the effect of exchange rate on firms' cash flows, in this study I examine exchange rate exposure from a different angle. I argue that since exchange rate movement affects firms' operation through its direct impact on firms' short-term cash flows, its ultimate impact on firms' fundamental values may vary cross-sectionally depending on the sensitivity of their values to volatilities of short-term cash flows. For example, if the liquidity of a firm is already low, then large fluctuation in its cash flows can easily push the firm into financial distress and as a result lead to changes in its fundamental value. Similarly, when a firm has substantial growth opportunities, but limited access to external financing, the effect of exchange rate movements will be more prominent as compared to other firms. This effect is due to the larger cost of underinvestment. Since exchange rate becomes important to a firm's fundamental value only when the resulting

short-term fluctuation of its cash flow forces it into financial distress or causes it to forsake positive NPV investment opportunities, the stock price of those firms that have greater expected costs of financial distress should exhibit more significant sensitivity to exchange rate movements.[1] Furthermore, among firms that are exposed to exchange rate risk, their exposures would be expected to vary cross-sectionally with their expected costs of financial distress in terms of both the probability of distress and the cost of distress.

An examination on this issue will help discover the cross-sectional variation in the sensitivity of stock returns to exchange movements. It may also help reconcile substantial evidence on the effect of exchange rate risk on firms' operations, but the limited evidence that shows the statistical and economic significance from the exposure. Although exchange rate risk may increase the volatility of firms' cash flows in the short term, it may not necessarily affect their returns, which are measures of their fundamental values. This could be the case because the firm is able to adjust in the longer term, for example, by switching suppliers to a less expensive currency or because of long-run purchasing power parity. However, when a firm's short term cash flow exposure to exchange rates is large enough that the exposure affects its liquidity, disrupts

[1]Note that greater financial distress costs can result in greater benefits if the exchange rate goes in favor of a firm.

its normal business or hurts its long run growth, the impact of exchange rate risk will lead to changes in stock price because investors will re-evaluate the fundamental value. That is, exchange rate changes, while having short-term effects, may not always be relevant to firms over the long term.

To test the hypothesis regarding the effect of the foreign exchange risk on firms' values, I estimate the foreign exchange exposure of a sample of 737 U.S. manufacturing firms using monthly stock return data between 1977 and 2000. For a sub-sample of firms with analyst earnings forecasts data available, I also examine their cash flow exposures using monthly analyst earnings forecasts as proxies for firms' near term cash flows. The relation between exchange rate exposure and firms' financial characteristics are explored through a two-step procedure. In our first step, I examine what type of firm is exposed to currency risk by comparing the financial characteristics of firms that exhibit significant return exposure with those of firms that do not. We divide the sample period into two sub-periods because of the differences in exchange rate behavior over those periods. The first period runs from 1/1977 through 4/1988. The second period covers 05/1998 through 12/2000. I find that firms whose returns have strong correlations with contemporaneous exchange rate movements generally have high levels of short-term leverage, low liquidity as proxied by the current

ratio, high sales, and larger R&D expenses, especially in the second period. Moreover, in the second period, which includes the recent high-tech boom, firms with larger costs of underinvestments; such as firms with more growth opportunities and higher R&D and selling expenses, also show a significant relation between their returns and exchange rate movements. In the second step, we restrict our attention to firms with a significant return exposure and we examine factors that determine the magnitude of that exposure. The results suggest that the magnitude of exchange rate exposure is related to proxies for firms' availability of internal funds, probability of financial distress and costs of underinvestment.

Given the problems associated with scant information on individual firms' foreign business activities, I also analyze the average time and industry-varying foreign exchange exposures at the level of 2-digit SIC industry groups over the 1989 to 1998 period, when monthly foreign trade data are available. By sorting firms into industry groups, I find that 12 out of 19 U.S. manufacturing industries show significant exchange rate exposures in directions consistent with the nature of their foreign trade balances. There is evidence that the overall exposure of U.S. manufacturing industries varies over time with their import and export shares as predicted by the theory. Most interestingly, I

find that the overall foreign exchange exposures of U.S. firms are significantly decreasing with their average liquidity and increasing with their average short-term leverage and growth opportunities both over time and cross-sectionally-a result that is consistent with the findings from individual firms' exposures.

Although previous studies largely focus on whether there is a statistically significant relation between exchange rate movements and stock returns over time, the economic significance of foreign exchange exposure can be better examined during periods of extreme exchange rate changes. That is, an examination of stock price response to large, unexpected exchange rate shocks can provide more reliable information regarding whether exchange rate risk has the potential to cause severe liquidity problem or affect the fundamental value of a firm. An analysis that is ideal for this purpose is the event study methodology. I examine firms' stock price response to the largest one-day movement (depreciation) of the U.S. dollar during the last three decades–the day after the announcement of the Plaza Accord in September of 1985. We further examine whether this response is related to the firms' short-term liquidity positions and their costs of financial distress.

We employ two measures of the stock price response to currency shocks: the cumulative abnormal returns and the abnormal daily return volatilities

during the event period. my result suggests that smaller firms, firms with larger short-term leverage, lower interest coverage ratio and lower dividend payouts show larger abnormal returns (in terms of absolute value) around the announcement. These firms also experience larger increase of daily return volatility in the 90 days surrounding the announcement from the same period a year ago. As a robustness check, I further examine the relation between firms' average abnormal returns during periods of large dollar movements and their financial characteristics, the result is consistent with what I find around the Plaza Accord.

The rest of Chapter 3 proceeds as follows. Section 3.2 reviews previous evidences on exchange rate exposure and potential explanations for them. In Section 3.3 I describe my sample selection process and data sources. Then Section 3.4 reports the estimate of individual firms' foreign exchange exposure and analyzes the relation between foreign exchange exposure and firms' financial characteristics. Section 3.5 presents results from industry level analysis. Section 3.6 tests the cross-sectional variation of firms' reaction to currency shock. Finally, Section 3.7 concludes Chapter 3.

3.2 Overview of Exchange Rate Exposure

For firms domiciled in the United States, current empirical studies have documented only weak correlations between exchange rate movements and firm value. For example, Jorion (1990) examines 287 U.S. multinationals and finds that only 5% of them have significant exposures. Although the evidence for firms domiciled in other countries is somewhat stronger, it is still relatively weak. For example, He and Ng (1998) and Glaum, Brunner and Himmel (1998) investigate Japanese and German firms, respectively and find more of a relation between stock returns and exchange rate movements, but even in these countries where presumably the large firms have relatively more foreign trade than do their U.S. counterparts, the percentage of firms they find to have significant exposures is still less than traditional predictions would expect.

The puzzle of why U.S. firms show such little apparent exchange rate exposure has not been completely explained. Exchange rate exposure certainly has the potential to be a significant risk factor for firms. As pointed out by Jorion (1990), the volatility of exchange rates is substantially larger than that of interest rates or inflation. There are several possible explanations for why researchers have documented such small exposures for U.S. firms. First, it may be due to the offsetting nature of the exposures. Since we lack

complete data on individual firms' imports, exports and business competitors, we cannot identify which firms are exposed to a given currency. For example, in Brown's (2001) study of the hedging practices of one U.S. firm, he finds that the firm hedges 24 different currencies due to both extensive foreign sales and the importation of a major portion of their manufacturing inputs. To mitigate this measurement problem, I examine exchange rate exposure at the industry level during the period of 1989-1998 when monthly imports and exports data of U.S. manufacturing industries are available.

Second, it may be due to the complexity of the foreign exposure since a firm's exchange risk can be varying over time as well as cross-sectionally. It may depend on the amount of foreign trade, the demand elasticity of the firm's product or the competitive reactions of other firms in the same industry. Allayannis (1997), Bodnar, Dumas, and Marston (2002) and Allayannis and Ihrig (2001) examine time-varying exposure at the industry level. They provide evidences that exchange rate exposures increase with the level of foreign trade and decrease with firms' ability to mark up the prices and pass through the impact of exchange movements to customers. These studies indicate that it is important to measure exposure in a specification that allows it to vary cross-sectionally and over time. In this study, I test an additional source of variation

by linking firms' exchange rate exposures to their expected cost of financial distress.

A third reason for U.S. firms to show such little apparent exposure is due to the rapid development of hedging instruments since the 1980s. Because of the availability of these instruments, more firms are actively involved in the management of their foreign exchange risk. A survey by Bodnar and Marston (1998) shows that foreign currency derivatives are the most commonly used class of derivatives. Among the surveyed firms that employ derivatives, 83% of them use foreign currency derivatives. Therefore, the increasing use of hedging techniques by firms along with their ability to make strategic moves more quickly, such as changing their supply sources, means that firms have more control over the degree to which currency exposure affects their operations and values. It also means that it is difficult for researchers to measure the true underlying exposure. Using a sample of Japanese multinational firms, He and Ng (1998) show that the extent to which a firm is exposed to exchange rate risk can be explained by variables that are proxies for its hedging needs, for example, the level of financial leverage, short-term liquidity position, and the size of the firm. One drawback to this explanation is that according to the Bank of International Settlement's 1998 triennial survey of derivatives, the

daily turnover for foreign exchange derivatives is only 6% of the turnover for interest rate derivatives. Thus, despite the fact that the volatility of exchange rate changes is substantially larger than that of interest rate changes, there is a much smaller use of derivatives, implying that foreign exchange exposure is smaller in magnitude than interest rate exposure. Also, the survey by Bodnar and Marston (1998) indicates that although many firms engage in currency hedging, they hedge selectively. Therefore, it is unlikely that hedging can completely insulate firms from currency risk.

3.3 Sample Selection and Data Description

Between January 1977 and December 2000, I select all 2224 firms that have at least 200 months of stock return data available from CRSP. Among this set of firms, I exclude firms that do not have financial information from Compustat. I further restrict my sample to those firms that are likely to be affected by foreign exchange risk. I consider the followings as indications of exchange rate exposure: reporting pretax foreign income, paying foreign income taxes, or reporting foreign currency adjustment based upon information from Compustat annual data. These restrictions reduce the number of firms in the sample to 1114. Since firms in manufacturing industries are most likely to be involved

in foreign businesses, in this study I focus on manufacturing firms. Thus, my final sample contains about 737 firms that are likely to be affected by currency risk.[2]

Each year I form 19 industry portfolios based upon firms' 2-digit SIC codes at the previous year end. I construct their monthly foreign trade shares by extracting monthly values of imports and exports of U.S. manufacturing industries against the world from the U.S. International Trade Commission. The imports data are U.S. general imports based upon general custom values. The total exports data are based upon FAS values. I then obtain total industry productions as proxied by manufacturing industry shipments from the Bureau of Economic Analysis. Since this data is only available on an annual basis, I calculate the monthly import and export shares by dividing the trade data by one-twelfth of the annual industry shipments.

To analyze firms' cash flow exposures and their reactions to the announcement of the Plaza Accord, I also obtain their earnings forecast data from the I/B/E/S summary history file. The monthly mean analyst forecasts for firms' annual earnings are used as the proxy for their expected near-term

[2]Although this selection process is not as precise as it would be if firm level foreign business data were available. However, as discussed earlier in the this study, the increasing globalization in recent years means that companies now often have multiple sources of direct and indirect exposure to a single currency. Therefore, my selection process may also include firms that have exchange rate exposures through other channels in addition to foreign sales.

cash flows. To calculate their abnormal returns and volatilities in response to the Plaza Accord and other large exchange rate movements, I collect their daily returns and CRSP value and equally weighted index from CRSP.

The foreign exchange rate is measured as the percentage change of the real, trade-weighted exchange rate index against major currencies. I check the sensitivity of the tests with respect to a number of other exchange rate indices. There are almost no differences between the results using various indices. Also, as indicated in previous studies, the choice of a nominal or real index is not crucial to the results since inflation is only a small component of the total variation of the exchange rate.

3.4 The Exchange Rate Exposure of Individual Firms

3.4.1 Estimation of Exchange Rate Exposure

I begin the analysis by measuring the foreign exchange risk in a simple setting. That is, for each of the 737 firms I measure their foreign exchange exposures by regressing their monthly stock returns on the percentage change in the

exchange rate index:

$$R_{j,t} = \alpha_j + \beta_j R_t^{fx} + \varepsilon_{j,t} \qquad \text{for t=1...T} \tag{3.1}$$

where $R_{j,t}$ is the stock return for firm j at time t, and R_t^{fx} is the percentage change of the exchange rate index for month t. The regression coefficient, β_j, is then the elasticity of firm j's value to the exchange rate. Since the trade-weighted index is defined as the value of foreign currency per dollar, an increase in its value indicates that the U.S. dollar appreciates at time t. Thus, if firm j has a positive β_j, it means that the firm's value increases when the dollar appreciates.

Previous studies have also modified equation (13.1) by including a market index return, either value-weighted or equal-weighted.

$$R_{j,t} = \alpha_j + \beta_j R_t^{fx} + \gamma_j VWRET_t + \varepsilon_{j,t} \tag{3.2}$$

$$R_{j,t} = \alpha_j + \beta_j R_t^{fx} + \gamma_j EWRET_t + \varepsilon_{j,t} \tag{3.3}$$

In models (13.2) and (13.3), $VWRET_t$ and $EWRET_t$ are the month t returns to the CRSP value-weighted and equal-weighted market indices respectively.

Table 13 presents the average exposure elasticity estimates for each of

these three models. Since I cannot identify whether an individual firm is a net importer or net exporter, I do not have a priori hypothesis concerning whether the regression coefficient should be positive or negative. Consequently, my interest is in the absolute value of the estimate. Based on model (13.1), 13.03% of the sample firms have either positive or negative exposure elasticities to exchange rate risk that is significant at the 10% level. The magnitude of the average absolute exchange rate coefficient implies that, on average, a one percent appreciation or depreciation of the U.S. dollar would be associated with a 0.372% change in a firm's market value. The extremely low average R^2 for these regressions implies that for these 737 firms, on average, changes in the value of the trade-weighted dollar index explain very little of the change in firm value.

Controlling for market returns in models (13.2) and (13.3) does not make a significant difference on the proportion of firms having significant exposure elasticities. In addition, not surprisingly, the average R^2 is much higher because of the explanatory power of market index returns on firm returns. Consistent with the evidence provided in Bodnar and Wong (1999), model (13.2), which uses a value-weighted index, generally detects a higher proportion of firms with positive exposures than does model (13.3), which uses an

equal-weighted index. On the contrary, more firms are found to have significantly negative exposure with an equal-weighted market index. As discussed in Bodnar and Wong (1999), this is probably due to the strong negative exposure of the value-weighted market portfolio, which is dominated by large firms. The implicit relation between individual firms' total exposure and the exposure of the market portfolio makes it difficult to assess whether a firm is affected by currency risk at all. Since my interest is not in estimating firms' market betas but in controlling for the correlation of macroeconomic effects with exchange rate, in this study I introduce an alternative control variable. That is, instead of including the value-weighted or equal-weighted market return, I match firms with CRSP size-based deciles according to their year-end market capitalization and control for influences of macroeconomic factors with returns on the size deciles that they belong to:

$$R_{j,t} = \alpha_j + \beta_j R_t^{fx} + \gamma_j DECRET_t + \varepsilon_{j,t} \tag{3.4}$$

where $DECRET_t$ is the return to the size decile portfolio that stock j belongs to at time t. This method, on the one hand, helps reduce the bias in estimates of exposure caused by strong aggregate exposures of market portfolios. On the other hand, it reduces the residual variance of model (13.1) in the same

way as do models (13.2) and (13.3) and thus improves the precision of the exposure estimates. Thus, unless otherwise stated, I will use model (13.4) to estimate foreign exchange exposure in all subsequent analyses. According to model (13.4), about 11.13% of the sample firms are significantly exposed to exchange rate risk over the whole period. This low percentage is broadly consistent with the the evidence in previous studies.

As Figure C.2 shows, the value of the trade-weighted dollar changed substantially over my twenty-four year sample period. A firm's foreign exchange exposure depends on the amount and nature of its foreign businesses, its market structure, the reactions of its competitor and its use of hedging tools. Because all of these determinants of exposure are changing across time, we would expect the firm's exposure to be time varying. For example, if a firm has monopolistic power in the international market, it will be able to pass through the effects of exchange rate movement to the consumers and bear no exchange rate risk. If other firms then later enter the market, the level of pass-through will decrease and the firm's foreign exchange exposure will increase.

To test whether U.S. firms' foreign exchange exposure shows time variation, I break the sample period into two sub-periods according to the two dif-

ferent behaviors of exchange rate movements. The first period is from 01/1977 through 04/1988, which was characterized by a persistent appreciation of the U.S. dollar after the breakdown of the Bretton Woods System and sharp devaluation following the Plaza Accord. The second period covers 05/1988 through 12/2000 during which the U.S. dollar index exhibited volatility without any strong trend in one direction. The estimate of exchange rate exposure for each sub-period is shown in Table 14. As can be seen from the table, firms that exhibit significant exchange rate exposures in one period do not necessarily do so in other periods. This may have to do with changing firm characteristics and competitive market condition over time. Therefore, it is important to examine exchange rate exposure by sub-period so that exposures over a short period are not masked over longer term.

3.4.2 An Alternative Measure of Exposure

Since the foreign exchange rate risk can have a direct impact on firms' short-term cash flows, in this section I examine the effects of exchange rate changes on a near-term measure of changes in a firm's operations, the change in analysts' forecasts of a firm's annual earnings. Using this measure, I can investigate whether exchange rate exposure is relevant to firm cash flow by examining

how analysts revise their forecasts in response to exchange rate movements. If analysts consider exchange rate exposure to be important to the firm's near-term earnings, then they should revise their estimates of those earnings when exchange rates change. Although the firm's earnings figure itself is an alternative candidate, it is not as good a measure as analysts' forecasts for two reasons. First, earnings are only available on a quarterly or annual basis, which means I would have low power for my tests due to the low frequency of the data. Analyst forecasts are available at a higher frequency (monthly). Second, the measurement of a firm's earnings is an ex post measure and my interest is in a measure of investor expectations, which is proxied by analyst forecasts. In these tests, I estimate a firm's cash flow exposure by measuring the revision of analyst earning forecasts around exchange rate movements. Since my earning forecast data only cover the 1977-1996 period, the intersection of the earning forecast data and the 737 sample firms with foreign businesses results in 439 firm in the twenty years. The following regression is run for each of the 439 firms in the earning forecast sample,

$$\frac{EPS_{j,t} - EPS_{j,t-1}}{P_{j,t-1}} = \alpha_j + \beta_j R_t^{fx} + \varepsilon_{j,t} \tag{3.5}$$

where $EPS_{j,t}$ is the month t analyst forecast of firm $j's$ annual EPS, $P_{j,t-1}$ is

the price of firm $j's$ stock in month $t-1$, and R_t^{fx} is the percentage change of trade-weighted value of foreign currency per U.S. dollar. Because analysts revise their forecasts at the beginning of each forecast period to reflect new information about firms' next period earnings, we control for this adjustment in model (13.6) by including $DUM_{j,t}$, a dummy variable added to control for any revision of the EPS forecast which is unrelated to the exchange rate fluctuation at the beginning of each fiscal year. $DUM_{j,t}$ is equal to 1 if $EPS_{j,t}$ is the first forecast of a particular fiscal year of firm j. It is equal to 0 if otherwise.

$$\frac{EPS_{j,t} - EPS_{j,t-1}}{P_{j,t-1}} = \alpha_j + \beta_j R_t^{fx} + d_j DUM_{j,t} + \varepsilon_{j,t} \tag{3.6}$$

Table 15 reports the results for models (13.5) and (13.6). For both models, the proportion of firms with statistically significant exposures to the exchange rate risk is slightly higher than that in Table 13. For model (13.5) I find significant exposures for 16.86% of the firms at the 10% level. Since analyst forecasts can be viewed as proxies for investors' expectations, this alternative measure of exchange rate exposure suggests that the percentage of firms whose cash flows are affected by currency risk is higher than that found through return exposure. These results imply that exchange rate exposure is

more of a short-term effect that cannot be as easily detected using changes in firm value. Thus, exchange rate movements seem to have an effect on firm value that investors expect to be short term. Further, since we still find a relatively small proportion of large U.S. firms with significant exposure, an interpretation is that investors expect that the other firms are not significantly affected due to offsetting exposures, either through hedging or through natural offsets.

Another distinguishing feature of using changes in analysts' forecasts in the model is that there are more firms with significantly positive exposure than firms with significantly negative exposure. That is, there are more firms in the U.S. that appear to benefit from an appreciation of the U.S. dollar than firms that are hurt by such an appreciation. This result is in contrast to the result for using stock returns in Table 13, where the percentage of positive versus negative exposure are approximately equal. Finally, the dummy variable in model (13.6) has a small effect on the coefficient estimates. But the fitness of the model is significantly improved.

The result from this alternative measure of foreign exchange exposure indicates that investors expect foreign exchange risk to have short-run effect on firms' operation. Therefore, foreign exchange risk is not necessarily always

relevant to firms' fundamental value.

3.4.3 Financial Characteristics and Exchange Rate Exposure

Given the various ways in which currency fluctuation can directly or indirectly affect firms' operations, it is important to determine how much of any immediate impact on cash flows is transformed into impact on firm values. In the following two sections I examine the relation between firms' financial characteristics and their exchange rate exposure. Specifically, I address two issues. First, what types of firms are more likely to be exposed to exchange risk? Second, among firms whose stock prices exhibit significant correlation with exchange rate movements, is there any cross-sectional variation in their exposures?

I hypothesize that the higher is a firm's expected cost of financial distress, the more likely the fluctuation of its cash flow from exchange rate movements leads to change in value. The expected cost of financial distress can be larger because of greater probability of financial distress. I examine financial characteristics that are related to firms' short-term liquidity: the quick ratio

and the current ratio.[3] Additional indicators of the probability of financial distress include the level of the firm's leverage: short-term leverage, which is the ratio of current liability to total asset; and the interest coverage ratio, defined as the sum of pretax income and interest expenses divided by interest expenses. Additionally, I consider the size of firm as proxied by total sales. However, although size is an indicator of the expected cost of financial distress, it has a more complex relation with the exchange rate exposure, making the effect of size on firms' exchange rate exposure ambiguous. On the one hand, large firms generally have more access to external and internal financing and therefore have lower probabilities of financial distress. On the other hand, large firms are also more likely to conduct multinational business and thus be more affected by exchange rate movements through multiple potential sources. Since firms' financial constraints affect the expected cost of financial distress, I measure financial constraints with total dividend payouts, defined by the total of dividends paid to preferred and common shareholders divided by the previous year's assets.

A firm's growth opportunities is related to its cost of financial distress. Firms with greater growth opportunities suffer more from underinvestment as

[3]The quick ratio is measured as cash and accounts receivable divided by current liabilities. The current ratio is the ratio of current assets to current liabilities.

the result of potential financial distress. However, underinvestment costs will only be realized in the presence of both large growth opportunities and costly external financing. Therefore, I examine the interaction terms between the level of external financing and growth opportunities as proxied by the total debt ratio*market-to-book ratio (M/B) and the total debt ratio*R&D/Sales. As discussed in Titman and Wessels (1988), the cost of financial distress can be large for firms with very specialized products because the consequence of disrupted long-run relation with customers and business partners is severe. While R&D expenses can proxy for degree of specialization, I also include the interaction term between the total debt ratio and Selling expenses/Sales as it has fewer missing values and is highly correlated with R&D expenses.[4] Due to the frequent missing of R&D expenses for many firms, in all regression analysis of this study, I use the interaction between total debt ratio and Selling expenses/Sales as the proxy for growth opportunities and product specialization.

Based upon the result of model (13.4) in Table 14, each period I classify all firms into two groups depending on whether the sensitivity of stock price to exchange rate movement is significant or not. I then compare these two

[4]Their correlation is as high as 60% in the sample.

groups period by period in terms of their financial characteristics. my main objective is to examine whether the long run fundamental values of firms with higher expected costs of financial distress are more likely to be affected by exchange rate risk. Table 16 presents the median value of these financial characteristics for each group during the twenty-four years. The Wilcoxon rank sum test indicates that during the first period of 01/1977-03/1985, firms that show significant return exposure to currency risk have lower current ratios but greater sales and R&D expenses. However, these firms seem to have significantly smaller selling expenses which is contrary to our expectation.

The results are very different during the second period. Over this period, the group of firms with significant exchange rate exposures appear to have a much lower quick ratio and total dividend payout as compared to firms not exposed to currency risk. At the median, they also have a 0.76% higher level of short-term leverage. These are strong indications that firms that suffer liquidity problems are more likely to be driven into financial distress through volatility of cash flows caused by exchange rate fluctuations. Again, I find that large firms are more likely to be exposed to exchange rate risk. Consistent with the underinvestment theory, I also find that exposed firms have greater growth opportunities as represented by the larger value of Total debt

ratio*M/B or Total debt ratio*R&D expenses. Note that the relation between growth opportunities and exchange rate exposure is stronger in the second period than in the first one. This may have to do with the dramatic increase in the number of high-tech firms in the second period that covers the recent technology boom.[5] Finally, firms that produce specialized products appear to be more affected by exchange rate risk.

In general, the observed differences between these two groups of firms in terms of these proxies for expected financial distress costs support the idea that exchange rate movement has an especially prominent impact on those firms whose values are very sensitive to short-term cash flows.

3.4.4 The Cross-Sectional Variation in Firms' Exchange Rate Exposures

Having identified the conditions over which exchange rate risk is detectable from stock price, I now turn to the issue of cross-sectional variation in firms' return exposure. In other words, I want to find the determinants of the magnitude of exchange rate exposure. In Table 17, I partition the group of firms

[5]An industry breakdown among firms with significant exchange rate exposure indicates that the concentration in the electronic and computer industries is much higher in the second period than in the first period.

that are found to have significant exchange rate exposure using different explanatory variables. Specifically, I classify firms into "high" and "low" groups based upon their average quick and current ratios, short-term leverage, interest coverage ratio, growth opportunities, and selling expenses in each period. Since I do not have any priors on whether a firm is a net importer or a net exporter, I focus on the magnitude rather than the sign of the exposure as estimated in Table 14. Table 17 reports the mean and median absolute value of the exposure for each high and low group. The p-values from the Wilcoxon rank-sum test of no differences in exposure across high and low groups are also presented. In at least one of the two periods, firms' exchange rate exposures increase with their short-term leverage, growth opportunities, and selling expenses and decrease with their interest coverage ratio and dividend payout. Interesting, although large firms are more likely to be exposed to exchange rate risk as shown in Table 16, I find that the magnitude of their exposures is significantly smaller as compared to firms with smaller sales that are also exposed to currency risk. Possible explanations for this finding include large firms' superior ability to minimize the risk that they are aware of through hedging or their higher possibility of having offsetting exposures which would reduce the impact of exchange rate risk.

Although I find firms with low liquidity and large financial distress cost are more exposed to exchange rate risk, these same characteristics also suggest strong incentives for firms to hedge foreign exchange risk. For example, Geczy, Minton and Schrand (1997) provide evidence that firms with greater growth opportunities and tighter financial constraints are more likely to use currency derivatives. In this study, I implicitly assume that hedging cannot fully insulate these firms from currency risk. This assumption is consistent with evidences provided in current literature. According to Brown (2001) and the survey by Bodnar and Marston (1998), most U.S. firms hedge selectively rather than completely. There is no evidence of superior financial performance for selective hedgers either. (See, for example, Brown, Crabb and Haushalter, 2002.)

3.5 Industry Level Analysis

Since a firm can face multiple currency exposures through direct and indirect channels, this study, as well as most previous empirical studies, uses a trade-weighted index to test the effect of exchange rate changes on firm value. By using this index, we are implicitly assuming that a firm is exposed to all currencies in the basket in the same magnitude as the composition of the

basket. If firms' exposures vary from this basket of exposures, the empirical tests may fail to capture the true underlying exposures. Moreover, without detailed firm level data on foreign business, it is difficult to assess firms' net exposure because their diverse exposures to multiple currencies may simply offset each other. Given that monthly U.S. foreign trade data are readily available at the industry level, in this section I examine the foreign exchange risk from a macro perspective by estimating net exposure at the industry level.

Since I am constrained by the availability of industry trade data, I conduct the industry level analysis for a shorter period of 10 years between 1989-1998. However, since I have information on each U.S. manufacturing industries' net trade positions and I am interested in their aggregate exposure, I do not have to restrict the sample to the 737 firms used in individual firm analysis. For all firms in the manufacturing section with stock and financial information available from CRSP and Compustat, each year I form industry portfolios' according to their previous year-end 2-digit SIC codes. Portfolios are formed on both an equal-weighted and value-weighted basis (the latter is according to firms' previous year's market capitalization). Over the sample period, these industry portfolios have an average of 96 firms in them each year with a minimum of 16 firms (the Rubber and Miscellaneous Plastics

industry) and a maximum of 298 firms (the Electronics industry).[6] First, for each value-weighted or equally weighted industry portfolio I regress their monthly returns on the percentage change of exchange rate and the value-weighted CRSP market index return. The estimates of exposure together with each industry's average trade balance over the 10 years are reported in Table 18.

According to Table 18, during the 10 years between 1989 and 1998, the majority of U.S. manufacturing industries has a trade deficit, which implies that they should have positive exposure to exchange rate risk. Indeed, I find that 12 out of these 19 equal-weighted industry portfolios show significantly positive exposures.[7] These exposures are economically significant as well because a 1% change in the value of the dollar will lead to 0.27% to 0.94% change in the value of these industry portfolios. The exposures documented in the value-weighted portfolios differ as only 7 out of the 12 industries still show significantly positive exposure when value-weighted portfolios are formed. One industry (SIC=38), which has trade surpluses, exhibits significantly negative

[6]The Tobacco industry is excluded because the number of firms is less than 4.

[7]By forming industry portfolios at 4-digit SIC level and running seemingly unrelated regression among them for each 2-digit SIC industry group, Allayannis (1997) finds that 3 out of 18 industry group exhibit significant exposures. One possible reason for our diverse results may be the different sample periods. Allayannis (1997) covers 1979 through 1995 while we focus on the period between 1989 and 1998.

exposure as expected. This indicates that although an industry may have a significant trade balance as a whole, it is possible that the impact of exchange rate movement is mainly born by small firms as large firms may engage in more effective hedging against exchange rate risk or have a more diverse base of local currency costs which serves to counterbalance the impact of exchange rate risk on their values.

Allayannis (1997) examines the time-varying exposure of industry portfolios and provides evidence that exchange rate exposure can vary with U.S. industry import and export shares. Bodnar et al (1998) and Allayannis and Ihrig (2001) also examine the effect the time variation of industry structure has on exposure. Motivated by this evidence of time-varying exposures, I examine how the exposures of industry returns vary with both industry trade shares and financial characteristics of typical firms' in those industries. To examine these two sources of variation cross-sectionally and over time, I estimate the aggregate exposure of U.S. manufacturing industries through the following pooled regression:

$$\begin{aligned} R_{i,t} &= \alpha + \beta_1 R_{mt} + \beta_2 R_t^{fx} \log(\frac{IMP_{i,t}}{V_{i,t}})(\text{expected cost of financial distress}) + \\ &\quad \beta_2 R_t^{fx} \log(\frac{IMP_{i,t}}{V_{i,t}})(\text{expected cost of financial distress}) + \varepsilon_{i,t} \end{aligned} \tag{3.7}$$

where $R_{i,t}$ is the return on industry i; R_{mt} is the value-weighted market return; R_t^{fx} is the return on the real trade-weighted dollar index; $\log(\frac{IMP_{i,t}}{V_{i,t}})$ and $\log(\frac{EXP_{i,t}}{V_{i,t}})$ are logged shares of imports and exports for industry i at time t respectively.

Under a fixed effect model, I estimate equation (14.1) using the median expected cost of financial distress of each industry as proxied by variables that measure firms' liquidity, availability of internal funds and growth opportunities. To facilitate comparison among different proxies, I use the inverse of quick ratio, current ratio, size and dividend to represent the expected costs of financial distress.[8] To allieviate the potential heterskedasticity from firms' market-to-book ratios, the growth opportunities is proxied by the total debt ratio*log(M/B). The results from equally weighted industry portfolios are shown in Table 19.[9] As predicted by the theory, exchange rate exposures of U.S. manufacturing industries are significantly increasing with their shares of imports and decreasing with shares of exports, which indicates that an appreciation of the dollar benefits importers and hurts exporters. More importantly, the benefit and cost of exchange rate movements appear to be increasing with firms' expected cost of financial distress as illustrated by the significance of

[8]We omit the coverage ratio because some firms have extremely negative coverage ratios. The inverse of negative coverage will wrongly indicate smaller costs of financial distress.

[9]Results from equally or value-weighted industry portfolios are very similar.

the interaction term among exchange rate movement, trade shares and all the variables I have considered to proxy for the expected cost of financial distress. That is, the exposure of U.S. manufacturing industries is significantly decreasing with quick ratio, current ratio, size and dividend payout and increasing with short-term leverage, growth opportunities and selling expenses. Interestingly, at the industry level the association between growth opportunities and return exposure is much more important than at the individual firm level. This may be due to larger dispersion of growth opportunities across industries than across individual firms within the same industry.

As a whole, under a specification that allows both time-series and cross-sectional variation of exposure, the industry analysis provides strong support to my hypothesis that exchange rate risk is more likely to affect the value of firms with larger costs of financial distress.

3.6 Stock Price Reaction to Exchange Rate Shocks

Doidge, Griffin and Williamson (2000) provide evidence that firms with large foreign sales underperform firms with no foreign sales during periods of large

currency appreciation and overperform them during periods of large currency depreciation. This suggests that the correlation between stock price and exchange rate may be stronger during large currency movements. In this section, I examine whether stock price reactions to exchange rate shocks vary systematically across firms. The findings on this issue will help us assess the economic significance of exchange rate exposure. If exchange rate risk has the potential to cause severe liquidity problem or affect the fundamental value of a firm, most likely the impact will be observed during large currency movements.

We examine these reactions using an event study approach. An advantage of the event study methodology is that I avoid imposing any specific structure on the relation between currency risk and firm value. Extensive evidence has shown that a firm's exposure may depend on the level of foreign trade (see, for example, He and Ng, 1998; Doidge et al, 2000), the competitive structure of the market in which it operates (see, for example, Bodnar, Dumas, and Marston, 1998; Allayannis and Ihrig, 2001.), and the size of the exchange rate movements (see Doidge et al, 2000). Although I have attempted to alleviate this problem by analyzing exposures in two different sub-periods and allowing for time-varying exposures, it is debatable whether the current approach of imposing a linear relation between exchange rate risk and return

is appropriate. The event study approach allows us to focus on the cross-sectional variation of foreign exchange exposure at a point of time without worrying about the specification problem.

First, I focus on how firms react to one of the most important economic events during the sample period, the announcement of the Plaza Accord. The Plaza Accord was signed on September 23, 1985. On the next day, the U.S. dollar experienced the largest one-day depreciation (-2.7%). Over the sample period, although the Plaza Accord was signed under the background of fundamental macroeconomic issues such as a large U.S. trade deficits and high unemployment rates, and the depreciation of dollar might, to some extent, be anticipated by investors, the actual magnitude of the dollar movement was still uncertain. I can thus infer how much a firm's value should be affected by the expected depreciation of the dollar from the abnormal returns and volatilities around the announcement. Since I lack information on firms' foreign sales at that time, it is difficult for us to distinguish whether the absence of reaction to the announcement of the Accord by individual firms is due to the irrelevance of exchange rate risk to firm value or due to the pure domestic nature of a firm's business. To circumvent this data problem, I infer whether a firm should be affected by the depreciation of dollar by examining revisions in ana-

lyst forecasts of firms' earnings after the Plaza Accord. Since analysts closely monitor the financial and operational conditions of the firms they follow, they will update their forecasts of firms' earnings if they expect those earnings to be significantly affected by the dollar depreciation. Since the news came at the end of September after most analysts had issued their forecasts, I compare forecasted earnings in October with the earlier August forecasts. If there is no change in the consensus earnings forecast of a firm's next period earnings, then I consider that firm as not exposed to exchange rate risk at that time and exclude it from the event study sample.

There are many sources of variation for stock returns. Particularly, for a joint economic agreement among major countries like the Plaza Accord, it is possible that stock prices react to the announcement through the influences of some macroeconomic factors that widely impact all firms rather than through their direct exposures to foreign exchange fluctuation. Due to this endogenous nature of the event, I am interested in examining the cross-sectional variation in stock price reactions around the announcement of the Accord rather than the magnitude of the reactions. I expect that if firms' earnings are affected by the exchange rate shock, then the stock price reactions should be more pronounced for those firms that are financially constrained or have large expected

financial distress costs.

To determine the stock price reactions, I estimate the following market model using a 180-day window that ends 60 days before September 23, 1985,

$$R_{i,t} = \alpha_i + \beta_i R_{mt} + \varepsilon_{i,t} \qquad \text{for t=-240,-60} \tag{3.8}$$

where R_{mt} is the return on the CRSP equally-weighted market index. Then I calculate the abnormal returns for each of the 5 days around the announcement,

$$AR_{i,t} = R_{i,t} - \alpha_i - \beta_i R_{mt} \qquad \text{t=-2,2} \tag{3.9}$$

After calculating the cumulative abnormal returns (CAR) over the five day window for each firm, I examine whether they vary systematically according to the financial characteristics I have found to be important in explaining exchange rate exposure. Specifically, I regress the absolute value of CAR on the quick ratio, short-term leverage, interest coverage dummy, log of sales, total dividend payouts, the interaction between total leverage and the log of market-to-book ratio, and the interaction between total leverage and selling expenses. All variables are calculated as of the end of 1984. I

focus on the absolute value of CAR because of the differences in reactions one would expect for net importers versus net exporters. Net importers should experience negative abnormal returns from the unexpected dollar depreciation while net exporters should experience positive ones.[10] To control for potential heteroskedasticity across firms, the dependent and independent variables are scaled by the standard deviation of residuals from equation (15.1). The results of this weighted least squares regression is presented in the first column of Table 20. As expected, the stock prices of firms with high short-term leverage, low coverage ratio, small size and low dividend payouts show stronger reaction to the news of sharp dollar depreciation than do firms that are less financially constrained. This result provides support to my hypothesis. When there is a large, unexpected shock to the value of the U.S. dollar, although cash flows of all firms in the event study sample are affected, stock prices of firms that have larger probabilities of financial distress respond more strongly in terms of larger magnitude of abnormal returns during the event period. I do not find any evidence that firms with greater growth opportunities experience larger abnormal returns.

I also employ an alternative approach to determine whether there is

[10]Since some firms have extremely negative interest rate coverage ratio, I replace the actual coverage ratio with a dummy variable that takes the value of one when a firm's coverage ratio is above the sample median and zero otherwise.

cross-sectional variation in stock price reaction to an exchange rate shock. Due to the uncertainty regarding the direction and magnitude of potential dollar movements at the time of the Plaza Accord, the volatility of the exchange rate was greater than normal. In the 91 days surrounding the announcement of the Plaza Accord, the volatility of daily percentage change of the dollar index increased to 0.0029% from the number of 0.0019% in the same period a year previous. Thus, I can examine the sensitivity of stock prices to exchange rate risk through the relation between exchange rate variability and stock return variability. Again, since I am interested in how firms' expected costs of financial distress are related to their return exposures, I examine whether return volatility is increased with higher exchange rate volatility and how this increase varies cross-sectionally. Therefore, I first calculate the ratio of firms' daily return volatility during the 91 days centered around the announcement day relative to that in the same period a year earlier. Then I regress the log of that ratio against the set of variables that proxy for firms' costs of financial distress. The result of this regression is shown in the second column of Table 20. Similar to the results from the abnormal returns, I find that the increase in volatility as the result of the exchange rate shock is larger for firms with higher short-term leverage, smaller size and lower coverage ratio.

Since the announcement of the Plaza Accord represents one single event, I also examine how stock prices respond to other large currency movements to check the statistical significance of my event study result. Specifically, I first calculate the standard deviation of daily percentage change of exchange rate over the whole sample period of 1977 to 2000. Then I define daily exchange rate changes that are more than four standard deviation, in absolute value, from zero as large currency movements. It turns out that there are 13 days (including the announcement day of the Plaza Accord) that fall into this category. For the 12 events excluding the announcement of the Plaza Accord, I calculate the cumulative abnormal returns during the five-day window of (-2,2) for all the 737 firms. Following the analysis on the Plaza Accord, I regress the absolute value of firms' average abnormal returns across the 12 events on their average cost of financial distress.[11] The result of this analysis is presented in the last column of Table 20. It appears that firms' average abnormal returns during large exchange rate movements are significantly increasing with their levels of short-term leverage, growth opportunities and selling expenses. On the other hand, small firms and firms with low dividend payout show significantly stronger response to exchange rate shocks. Therefore, the pattern in

[11]The 13 large exchange rate movements take place in the year of 1978, 1981, 1985, 1988, 1989, 1995 and 1998. Firms' average financial characteristics are averages across these 7 years.

firms' reaction to the announcement of the Plaza Accord is persistent across all kinds of large exchange rate movements.

3.7 Summary of Chapter 2

In summary, Chapter 3 examines the exchange rate exposure of U.S. manufacturing firms from a new perspective. By noting that exchange rate changes affect a firm's operation through its impact on cash flows, I propose that whether or how much a firm's fundamental value is exposed to currency risk depends on how sensitive its value is to the volatility of short-term cash flows.

I find the returns of firms with higher expected financial distress costs, for example, lower liquidity, smaller size and greater growth opportunities, are more likely to be significantly correlated with exchange rate changes. Among firms with significant foreign exchange exposure, the magnitude of the exposures tends to increase with their expected financial distress costs. I provide additional support to our hypothesis by showing that at the aggregate level, U.S. manufacturing industries' exchange rate exposures also exhibit significant correlation with the return's sensitivity to short-term cash flows, and this correlation appears to be even stronger than at the individual firm level. Finally, I examine exchange rate exposure through an event study methodology. I

find that during a large, unexpected depreciation of the dollar after the Plaza Accord, firms with higher expected costs of financial distress show larger exposure as measured by their larger abnormal returns and abnormal volatilities in response to the exchange rate shock.

Appendix A

Proofs of Results

In this appendix, the equilibrium is derived under three conditions: symmetric information (section A1), asymmetric information (section A2), and multiple incumbents (section A3).

A.1 Equilibrium Under Symmetric Information

Under symmetric information in terms of firm 2's type, H will bid firm 1 for $B^{H^*} = \frac{(a-2C^I+C^S)^2}{9b}$ and L will bid for $B^{L^*} = \frac{(a-C^I)^2}{4b}$. Firm 1 will reject any other offer.

Before entry occurs, firm 1 maximize:

$$\max_{q_1}(a - bq_1) * q_1 - C^I * q_1 \tag{A1.1}$$

The maximization in equation (A1.1) leads to the equilibrium quantity and profit of:

$$\begin{aligned} q_1^{w/o} &= \tfrac{(a-C^I)}{2b} \\ \pi_1^{w/o} &= \tfrac{(a-C^I)^2}{4b} \end{aligned} \tag{A1.2}$$

If L approaches firm 1 with a merger offer, firm 1's payoff will be the bid if the offer is accepted. L's payoff will be:

$$\Pi_2^{M,L} = \frac{(a-C^I)^2}{4b} - B,\ if\ C^B > C^S > C^I\ or\ C^B > C^I > C^S$$
$$\Pi_2^{M,L} = \frac{(a-C^B)^2}{4b} - B,\ if\ C^I > C^B > C^S \tag{A1.3}$$

because the merged the firm will adopt the technology of the more efficient party.

If the offer from L is rejected, then L will have to enter the market directly, in which case it will play a two-firm Cournot game with firm 1. Their objective function will be:

$$\max_{q_i}[a - b(q_1 + q_L)]q_i - C^I * q_i,\ i = 1, L \tag{A1.4}$$

The payoff of L will be its share of profits in the two-firm Cournot game net of the fixed entry cost:

$$\Pi_2^{E,L} = \frac{1}{9b}(a - 2C^B + C^I)^2 - F < 0 \tag{A1.5.1}$$

The payoff of firm1 will be:

$$\Pi_1^{E,L} = \frac{1}{9b}(a - 2C^I + C^B)^2 \tag{A1.5.2}$$

Since L's post direct entry profit is not enough to recover the fixed entry cost, L will not enter the market if firm 1 rejects the merger offer. In that case, firm 1 will continue to earn $\pi_1^{w/o} = \frac{(a-C^I)^2}{4b}$. Therefore, in equilibrium firm 1 will reject any offer from L that is lower than its current profit. On the other hand, L has no incentive to deviate from $B^{L^*} = \frac{(a-C^I)^2}{4b}$ because by offering $B < B^{L^*}$its offer will be rejected and it will earn zero.

When facing a merger offer from H, firm 1's payoff will be the bid if the offer is accepted. H's net payoff will be:

$$\begin{gathered} \Pi_2^{M,H} = \frac{(a-C^I)^2}{4b} - B,\ if\ C^B > C^S > C^I \\ \Pi_2^{M,H} = \frac{(a-C^S)^2}{4b} - B,\ if\ C^I > C^B > C^S\ or\ C^B > C^I > C^S \end{gathered} \tag{A1.6}$$

If the offer is rejected, H will have to enter the market directly, which will lead to the net payoff of:

$$\Pi_2^{E,H} = \frac{1}{9b}(a - 2C^S + C^I)^2 - F > 0 \tag{A1.7}$$

On the other hand, firm 1's payoff will be $\Pi_1^{E,H} = \frac{1}{9b}(a - 2C^I + C^S)^2 = B^{H^*}$. Therefore, in equilibrium if H offers B^{H^*} to firm 1, neither party will have any incentive to deviate. If H offers $B < B^{H^*}$, its offer will be rejected by firm 1 because firm 1 will earn $\pi_1^{E,H} = B^{H^*} > B$. H will then enter directly and make $\Pi_2^{E,H} = \frac{1}{9b}(a-2C^S+C^I)^2-F$. Since by assumption , $\pi_1^{E,H}+\pi_2^{E,H}-F-\pi_2^{M,H} < 0$,

$$\Pi_2^{E,H} < \Pi_2^{M,H} = \pi_2^{M,H} - B^{H^*}$$

Therefore, H will not deviate. Similarly, firm 1 has no incentive to deviate from the equilibrium strategy and reject B^{H^*} because its payoff in the two-firm Cournot competition will be exactly the same as B^{H^*}.

A.2 Equilibrium Under Asymmetric Information

In this appendix I prove the equilibrium outcome when the type of firm 2 is unknown to firm 1. When $E(\pi_1^E) > \pi_2^{M,H} - (\pi_2^{E,H} - F)$ there exists a separating equilibrium: H will not bid for firm 1 but enter the market directly; L will

offer $B^{L^*} = \pi_1^{w/o}$. The separating equilibrium is supported by the out-of-equilibrium belief of Firm 1 that an offer that is less than B^{L^*} must be from L and will then be rejected.

Case 1: $C^B > C^S > C^I$

First let's see why H does not want to make any off equilibrium move. If H makes an offer of B such that $B > B^{L^*}$, firm 1 will accept the offer. Then H's net payoff will be:

$$\Pi_2^{M,H} = \frac{1}{4b}(a - C^I)^2 - B < \frac{1}{4b}(a - C^I)^2 - B^{L^*} = 0$$

which is less than $\Pi_2^{E,H} = \frac{1}{9b}(a-2C^S+C^I)^2-F$,its net payoff from direct entry. Therefore, H will be worse off by deviating from equilibrium strategy. L will also stick to the equilibrium strategy because if it bids lower it will be rejected and left with no other entry choice. Next I will show that firm 1 will not be better off if it accepts any offer less than $B^{L^*} = \pi_1^{w/o}$. First, if it is facing a bid $\pi_2^{M,H} - (\pi_2^{E,H} - F) < B < \pi_1^{w/o}$, it can infer that the offer is from L because H will not make any offer greater than $\pi_2^{M,H} - (\pi_2^{E,H} - F)$ which will leave its post merger net payoff to be $\Pi_2^{M,H} = \pi_2^{M,H} - B < \pi_2^{E,H} - F$. Thus firm 1 will act according to its equilibrium strategy to reject such an offer. Second, if it is

facing a bid less than or equal to $\pi_1^{E,H}$, obviously it will reject the offer because even if the offer is from H, firm 1 still can make $\pi_1^{E,H}$in the two-firm game with H. Third, if firm 1 is approached with $\pi_1^{E,H} < B \leq \pi_2^{M,H} - (\pi_2^{E,H} - F)$, then entrant is equally likely to be H or L. In this case, firm 1 expects to make:

$$E(\pi_1^E) = \frac{1}{2}(\pi_1^{E,H}) + (1 - \frac{1}{2})(\pi_1^{w/o}) \tag{A2.1}$$

if rejects such an offer. However, if $E(\pi_1^E) > \pi_2^{M,H} - (\pi_2^{E,H} - F)$, there is no reason for firm 1 to accept $B \leq \pi_2^{M,H} - (\pi_2^{E,H} - F)$ even if firm 1 cannot tell whether the bidder is H or L. In other words, there is no value of B which can separate H from L and firm 1 would rather bear the risk of rejecting H than accepting a bid which could possibly come from L. Note that the smaller b and F are, the more likely $E(\pi_1^E) > \pi_2^{M,H} - (\pi_2^{E,H} - F)$ will be satisfied.

Following from the above analysis, when $E(\pi_1^E) \leq \pi_2^{M,H} - (\pi_2^{E,H} - F)$, there exists a pooling equilibrium where both H and L will bid at firm 1's reservation price of $E(\pi_1^E)$.

Case 2: $C^I > C^B > C^S$ or $C^B > C^I > C^S$

In this case, it is possible that when H is much more efficient than C, the benefit of merging with firm 1 is so large that H will be willing to pay more than L does to merge with firm 1. This will occur when $\max(B^H) =$

$\pi_2^{M,H} - (\pi_2^{E,H} - F) > \pi_1^{w/o}$. However, even if there exists a value of B^H at which L cannot afford to mimic H, H would rather pool with L by paying the reservation price of $E(\pi_1^E)$ to firm 1.

When $\max(B^H) = \pi_2^{M,H} - (\pi_2^{E,H} - F) \leq \pi_1^{w/o}$, the analysis is similar to case 1 where there could be either separating equilibrium or pooling equilibrium depending on the value of b and F.

A.3 Equilibrium With More Than One Incumbent

When there are more than one incumbent in the market, the merger between firm 1 and firm 2 will have spillover effect on other firms in the market. The strategic response of other incumbents than the target will affect the H's decision on whether pooling with L or signaling its type by entering the market directly.

Suppose firm 3 is identical to firm 1 and is producing in the same market together with firm 1. Now if there exists a pooling equilibrium in which both H and L will enter by merging with firm 1, firm 3 will play the two-firm Cournot game with the combined firm and decide on its quantity in

next period based upon its expectation of the merged firms' marginal cost. The objective function of firm 3 is given by:

$$\max \frac{1}{2}\left\{[a-b(q^H+q_3)]q_3 - C^I q_3\right\} + (1-\frac{1}{2})\left\{[a-b(q^H+q_3)]q_3 - C^I q_3\right\} \tag{A3.1}$$

The best response function of firm 3 is:

$$q_3 = \frac{a - C^I - b[\frac{1}{2}q^L + (1-\frac{1}{2})q^H]}{2b} \tag{A3.2.1}$$

Similarly, the best response function of H is:

$$q^H = \frac{a - bq_3 - C^S}{2b} \tag{A3.2.2}$$

Solving the Cournot game, the Nash equilibrium strategy by H is given by:

$$\begin{aligned} q^H &= \tfrac{2a+2C^I-[\frac{1}{2}C^S+(1-\frac{1}{2})C^B]-3C^S}{6b} \\ \pi_2^{M,H} &= \tfrac{(2a+2C^I-[\frac{1}{2}C^S+(1-\frac{1}{2})C^B]-3C^S)^2}{36b} \end{aligned} \tag{A3.3}$$

When there are two incumbents and one entrant,

$$E(\pi_1^E) = \frac{1}{2}\frac{(a-C^I)^2}{9b} + (1-\frac{1}{2})\frac{(a-2C^I+C^S)^2}{16b} \tag{A3.4}$$

$$\pi_2^{E,H} = \frac{(a-3C^S+2C^I)^2}{16b} - F \tag{A3.5}$$

If $\pi_2^{M,H} - E(\pi_1^E) < (\pi_2^{E,H} - F)$, then H will deviate from the equilibrium strategy of pooling with L and bidding firm 1 for $E(\pi_1^E)$. According to analysis in appendix B, as long as $E(\pi_1^E) < \frac{(a-C^S+C^I)^2}{9b} - \frac{(a-3C^S+2C^I)^2}{16b} + F$,the pooling equilibrium will be sustained. Now with the strategic response from other incumbents, the possible parameter region of b and F that can support a separating equilibrium is expanded. Since

$$\frac{(2a+2C^I-[\frac{1}{2}C^S+(1-\frac{1}{2})C^B]-3C^S)^2}{36b} < \frac{(a-2C^S+C^I)^2}{9b} \tag{A3.6}$$

The pooling equilibrium will only be viable when

$$E(\pi_1^E) < \frac{(2a+2C^I-[\frac{1}{2}C^S+(1-\frac{1}{2})C^B]-3C^S)^2}{36b} - \frac{(a-3C^S+2C^I)^2}{16b} + F \tag{A3.7}$$

The separating equilibrium becomes more likely if we take the strategic response of other incumbents into consideration. When A3.7 does not hold, only the separating equilibrium can be sustained. Again, the smaller b and F are, the more likely pooling equilibrium will be broken.

Appendix B

Tables

Table 1

Summary Statistics of the Foreign Direct Investment Data

Total number of foreign direct investment is the total of M&A, joint ventures and new plants that took place in the U.S. each year. Industry level measures are calculated according to the Fama-French 48 industry groupings.

Panel A: Time Series Distribution of M&A in Foreign Direct Investment

	Total M&A	Total FDI	Average M&A/FDI Each Industry	Average # of M&A Each Industry
87	495	738	69.92%	15.00
88	440	626	69.23%	14.19
89	440	603	71.03%	14.67
90	352	478	71.95%	14.08
91	227	350	64.17%	10.32
92	112	197	53.82%	6.22
93	112	182	62.33%	6.22
94	142	225	64.59%	7.89

Panel B: Correlation Matrix of Proxies for Fixed Entry Cost and Market Competitiveness

	R&D/Sales	Advertising/Sales	Capexp/PPE	Selling/Sales	H-index
R&D/Sales	1	-0.0113	0.3597[a]	0.6060[a]	0.1604[b]
Advertising/Sales		1	-0.0659	0.1586[b]	0.1144
Capexp/PPE			1	0.4805[a]	0.4254[a]
Selling/Sales				1	0.3586[a]
H-index					1

a, b, and c denote for significance at 1%, 5%, and 10% respectively

Table 2
Cross-Industry Variation in the Frequency of Mergers

Across all industries and all years between 1987-1994, the log ratio of the total number of mergers to the total number of direct entry in each industry is regressed on the previous year's industry characteristics. t-statistics based on Newey-West (1987) autocorrelation and Heteroskedasticity consistent standard errors are reported in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.8672 (4.21)[a]	0.5454 (1.97)[b]	0.2379 (0.65)	0.3277 (0.93)	0.7152 (2.75)[a]	-0.2121 (-0.55)
R&D/Sales	3.5286 (2.53)[a]					2.7756 (2.07)**
Advertising/Sales		17.4193 (1.76)[c]				22.5185 (2.22)**
Capexp/PPE			3.1503 (2.44)[b]			2.4055 (1.85)*
Selling/Sales				3.0886 (2.47)[b]		
H-index					2.1784 (1.77)[c]	0.3593 (0.25)
Drug	-0.9224 (-1.63)	-0.1426 (-0.46)	-0.1379 (-0.49)	-0.6992 (-1.70)[c]	0.1446 (0.50)	-1.1161 (-1.89)*
Chemical	-0.6546 (-3.45)[a]	-0.7051 (-3.50)[a]	-0.5556 (-2.70)[a]	-0.5621 (-2.84)[a]	-0.5960 (-2.97)[a]	-0.6463 (-3.05)***
Oil	0.5354 (2.16)[b]	0.7907 (2.75)[a]	0.6911 (3.29)[a]	0.7040 (2.56)[a]	0.5341 (2.34)[b]	1.1249 (4.06)***
Auto	-2.0714 (-6.53)[a]	-1.9868 (-6.54)[a]	-2.0976 (-6.63)[a]	-1.8342 (-5.40)[a]	-2.0976 (-6.96)[a]	-1.9157 (-6.19)***
Electronic	-0.4398 (-1.72)[c]	-0.2306 (-0.89)	-0.4081 (-1.58)	-0.4900 (-1.93)[b]	-0.5443 (-2.11)[b]	-0.3138 (-1.12)
Year 88-94	omitted	omitted	omitted	omitted	omitted	omitted
N	182	182	182	182	182	182

a, b, and c denote for significance at 1%, 5%, and 10% respectively

Table 3

Probit Analysis of the Relation Between Merger and Industry Characteristics

Across all industries and all years between 1987-1994, the ratio of total number of cross-border mergers over total number of foreign direct investment in each industry is regressed on the previous year's industry characteristics using a probit model. The Chi-square test statistics are reported in parentheses. a, b, and c denote for significance at 1%, 5%, and 10% respectively

	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.4665 (78.19)[a]	0.1580 (3.70)[b]	0.0392 (0.15)	0.1817 (4.26)[b]	0.3821 (41.89)[a]	-0.4313 (10.71)[a]
R&D/Sales	2.7139 (15.96)[a]					2.1646 (5.75)[b]
Advertising/Sales		16.8844 (32.46)[a]				21.5011 (46.36)[a]
Capexp/PPE			2.2078 (32.35)[a]			1.8574 (11.79)[a]
Selling/Sales				1.7118 (23.73)[a]		
H-index					1.4746 (23.03)[a]	0.0827 (0.04)
Drug	-0.5576 (5.75)[b]	-0.1990 (1.06)	-0.0908 (0.23)	-0.4045 (3.78)[b]	0.0782 (0.17)	-0.8134 (8.68)[a]
Chemical	-0.4045 (21.73)[a]	-0.4582 (27.50)[a]	-0.3284 (14.04)[a]	-0.3612 (17.19)[a]	-0.3648 (17.56)[a]	-0.4084 (20.95)[a]
Oil	0.1915 (2.10)	0.4465 (9.91)[a]	0.3366 (6.09)[a]	0.2594 (3.75)[b]	0.1878 (2.02)	0.7416 (24.49)[a]
Auto	-1.3633 (134.60)[a]	-1.2708 (113.75)[a]	-1.3924 (140.85)[a]	-1.2461 (106.22)[a]	-1.3813 (138.48)[a]	-1.2155 (102.31)[a]
Electronic	-0.3890 (6.88)[a]	-0.2119 (2.02)	-0.3593 (5.91)[b]	-0.4123 (7.71)[a]	-0.4584 (9.34)[a]	-0.2442 (2.57)
Year 88-94	omitted	omitted	omitted	omitted	omitted	omitted
N	182	182	182	182	182	182

Table 4

Time Series and Geographic Distribution of Merger Activities During 1981-1998

Industry and country breakdown is based upon the target sample. Since bidders and targets may not both be publicly traded firms around announcement dates, each year the number of targets and bidders may be different.

			From Target Sample			
YEAR	Bidder	Target	Domestic Cross-Ind	Domestic Within-Ind	Cross-border Cross-Ind	Cross-border Within-Ind
81	173	88	53	30	2	3
82	184	99	56	32	4	2
83	307	112	68	34	2	4
84	351	171	95	54	8	1
85	120	138	92	39	6	1
86	157	198	107	67	16	6
87	163	189	109	53	13	14
88	182	253	145	67	21	19
89	188	173	91	48	23	11
90	165	105	45	38	12	9
91	199	80	45	28	6	1
92	273	63	28	34	1	0
93	341	92	42	42	4	4
94	456	162	67	76	12	7
95	558	230	99	105	12	14
96	609	242	114	109	14	5
97	679	334	157	137	31	9
98	683	385	148	189	22	26
Total	5788	3114	1561	1182	209	136

Country breakdown

Region	Number of Deals	Percentage
Japan	24	6.96%
UK	110	31.88%
Canada	59	17.10%
Major European	85	24.64%
Other	67	19.42%

Table 5

Comparison of Deal Characteristics Across Domestic Cross Industry and Cross-Border Deals

Pearson Chi-square test is used to test the significance of differences between domestic and cross-border deals in terms of the percentage of hostile deals, pure cash or pure stock offers, deals with competing bids and the percentage of tender offers.

Whole sample (1981-1998)

	Domestic	**Cross-border**	**Difference**
	N=1561	N=345	(p-value)
Hostile	4.68%	6.68%	(0.189)
Cash	52.15%	73.04%	(0.001)[a]
Stock	19.99%	7.25%	(0.001)[a]
Compete	9.56%	11.92%	(0.186)
Tender	35.81%	57.97%	(0.001)[a]

1980s

	Domestic	**Cross-border**	**Difference**
	N=816	N=156	(p-value)
Hostile	6.62%	9.62%	(0.182)
Cash	52.45%	78.85%	(0.001)[a]
Stock	11.64%	1.28%	(0.001)[a]
Compete	12.41%	17.42%	(0.091)[c]
Tender	43.01%	62.18%	(0.001)[a]

1990s

	Domestic	**Cross-border**	**Difference**
	N=745	N=189	(p-value)
Hostile	2.55%	3.70%	(0.389)
Cash	51.81%	68.25%	(0.001)[a]
Stock	29.13%	12.17%	(0.001)[a]
Compete	6.44%	7.41%	(0.643)
Tender	27.92%	54.50%	(0.001)[a]

a, b, and c denote for significance at 1%, 5%, and 10% respectively

Table 6

Abnormal Returns for Targets and Bidders

This table shows the abnormal returns for target and bidder shareholders around the merger announcement day. The table is divided between domestic mergers that are cross industry and cross-border mergers. The last column provides a test of the difference in abnormal returns between these two types of mergers. Event window is defined to be 3 days before and 3 days after the announcement day. Estimation window is 240 days before the event to 41 days before the event. CRSP equally-weighted return is used to proxy for the U.S. market return and Datastream country index returns are used for other markets.

Panel A: Target

	Domestic		**Cross-border**		
Eevent Day	AR(%)	z-score	AR(%)	z-score	z-stat of Difference
-3	0.85%	10.52	0.66%	4.66	-0.26
-2	0.87%	12.26	1.71%	8.84	2.77
-1	1.81%	25.65	1.76%	13.40	1.22
0	13.25%	180.64	16.80%	113.13	25.43
1	3.65%	55.51	4.42%	28.95	2.55
2	0.21%	3.87	0.54%	4.05	2.02
3	-0.12%	0.37	-0.46%	-0.52	-0.63
CAR(-3,3)	20.52%	109.16	25.43%	65.20	

Panel B: Bidder

	Domestic		**Cross-border**		
Eevent Day	AR(%)	z-score	AR(%)	z-score	z-stat of Difference
-3	0.20%	3.14	0.16%	1.86	0.52
-2	0.19%	1.83	0.01%	0.09	-0.61
-1	0.34%	2.61	0.38%	2.52	1.34
0	0.88%	8.69	0.31%	0.07	-3.21
1	0.43%	3.11	0.11%	1.70	0.39
2	0.00%	0.39	0.00%	0.90	0.68
3	0.04%	0.80	-0.32%	-2.74	-2.84
CAR(-3,3)	2.08%	7.78	0.65%	1.66	

Table 7

Regression Analysis of Target and Bidder Wealth Gains in Domestic and Cross-Border Takeovers

The 7-day cumulative abnormal returns for targets and bidders are regressed against deal characteristics in Weighted Least Square regressions. Cross-border, cross-ind, cash, hostile, compete and take100% are binary variables set equal to one for cross-border deals, cross industry deals, pure cash offers, hostile takeovers, deals with competing bids and deals in which the acquirer owns 100% of the merged firm, respectively. Cross*FX is defined as the interaction between the cross-border dummy and quarterly percentage deviation of U.S. real exchange rate index from its average level during the sample period. Cross*stock is the interaction term between the cross-border dummy and a dummy variable indicating deals that are completed entirely or partially with equity. Size is the logged ratio of the deal value to the bidding firm's market capitalization three months before the announcement date. Tax81 is a dummy variable for deals announced during 1981-1986. WWtax is a binary variable that is equal to one for U.K. and Japanese acquirers during the period of 1981-1986. Advisor indicates those deals in which the target firms' financial advisors are top investment banks. t-statistics from the Weighted Least Square regression are reported in parentheses.

	Intercept	Cross Border	Cross Industry	Cash	Hostile	Compete	Take 100%	Cross *FX	Cross *Stock	Size	Tax81	WWtax	Advisor
Target	0.0780	0.0349	-0.0094	0.0382	0.0913	-0.0838	0.1330	-0.2489			-0.0343	0.0557	-0.0081
	(2.71)[a]	(2.30)[b]	(-0.40)	(3.98)[a]	(5.03)[a]	(-5.64)[a]	(8.59)[a]	(-2.52)[a]			(-3.44)[a]	(1.32)	(-0.82)
	N: 1884 Adjusted R^2: 0.081												
Bidder	0.0269	-0.0122	-0.0042	-0.0009	-0.0164	-0.0084	-0.0079	0.0341	0.0148	0.0023	-0.0086	0.0169	-0.0067
	(3.61)[a]	(-2.81)[a]	(-0.79)	(-0.31)	(-2.14)[b]	(-1.31)	(-1.83)[c]	(1.17)	(1.76)[c]	(2.93)[a]	(-2.75)[a]	(1.34)	(-1.90)[c]
	N: 2959 Adjusted R^2: 0.010												

a, b, and c denote for significance at 1%, 5%, and 10% respectively

Table 8

Effect of Industry Characteristics on Differences in Wealth Gains Between Domestic and Cross-Border Takeovers

The 7-day cumulative abnormal returns for targets and bidders are regressed against deal characteristics in Weighted Least Square regressions. Deals are assigned into two groups according to the level of fixed entry cost and market competition of the target industry.

Target

	Intercept	Cross Border	Cross Industry	Cash	Hostile	Compete	Take 100%	Cross *FX	Cross *Stock	Size	Tax81	WWtax	Advisor
R&D<Median & H-index<0.18	-0.0252	0.0766	0.0786	0.0317	0.1028	-0.0825	0.1482	-0.4814			-0.0248	0.0514	-0.0166
	(-0.61)	(3.48)[a]	(2.22)[b]	(2.36)[b]	(3.94)[a]	(-4.22)[a]	(7.38)[a]	(-3.89)[a]			(-1.81)[c]	(0.81)	(-1.25)
	N: 896 Adjusted R^2: 0.112												
Others	0.1631	0.0228	-0.0730	0.0465	0.0767	-0.0829	0.1082	0.1447			-0.0437	-0.0417	0.0010
	(3.95)[a]	(0.96)	(-2.32)[b]	(3.30)[a]	(3.00)[a]	(-3.62)[a]	(4.44)[a]	(0.73)			(-2.89)[a]	(-0.57)	(0.07)
	N: 988 Adjusted R^2: 0.057												

Bidder

	Intercept	Cross Border	Cross Industry	Cash	Hostile	Compete	Take 100%	Cross *FX	Cross *Stock	Size	Tax81	WWtax	Advisor
R&D<Median & H-index<0.18	0.0292	-0.0177	-0.0109	0.0023	-0.0073	0.0004	-0.0088	0.0430	0.0299	0.0009	-0.0087	0.0086	-0.0115
	(2.95)[a]	(-3.22)[a]	(-1.54)	(0.57)	(-0.69)	(0.05)	(-1.61)	(1.32)	(2.72)[a]	(0.82)	(-2.14)[b]	(0.64)	(-2.29)[b]
	N: 1390 Adjusted R^2: 0.012												
Others	0.0239	-0.0042	0.0047	-0.0026	-0.0264	-0.0167	-0.0080	0.0533	-0.0026	0.0039	-0.0083	0.0158	-0.0028
	(2.12)[b]	(-0.53)	(0.59)	(-0.59)	(-2.36)[b]	(-1.69)[c]	(-1.16)	(0.84)	(-0.20)	(3.42)[a]	(-1.70)[c]	(0.51)	(-0.55)
	N: 1567 Adjusted R^2: 0.010												

a, b, and c denote for significance at 1%, 5%, and 10% respectively

Table 9

Abnormal Returns for Targets and Bidders in Related Mergers

This table shows the abnormal returns for target and bidder shareholders around the merger announcement day. The table is divided between domestic mergers and cross-border non-diversifying mergers. The last column provides a test of the difference in abnormal returns between these two types of mergers.
Event window is defined to be 3 days before and 3 days after the announcement day. Estimation window is 240 days before the event to 41 days before the event. CRSP equally-weighted return is used to proxy for the U.S. market return and Datastream country index returns are used for other markets.

Panel A: Target

	Domestic		**Cross-border**		
Eevent Day	AR(%)	z-score	AR(%)	z-score	z-stat of Difference
-3	0.67%	6.41	0.72%	3.24	-0.94
-2	0.99%	8.67	1.70%	7.75	1.50
-1	2.43%	19.85	2.02%	12.59	-0.76
0	14.02%	110.27	17.81%	94.09	14.89
1	4.24%	37.22	4.67%	24.53	-0.80
2	0.26%	2.88	0.15%	0.77	-0.99
3	-0.02%	0.33	-0.45%	-0.13	-0.29
CAR(-3,3)	22.58%	70.15	26.62%	53.99	

Panel B: Bidder

	Domestic		**Cross-border**		
Eevent Day	AR(%)	z-score	AR(%)	z-score	z-stat of Difference
-3	0.17%	1.08	0.29%	2.06	1.32
-2	0.08%	-0.29	-0.02%	0.02	0.15
-1	0.07%	-0.47	0.19%	0.86	0.98
0	0.50%	4.38	0.04%	-2.74	-4.47
1	0.20%	-0.02	0.01%	1.35	1.20
2	0.09%	1.98	0.07%	0.67	-0.32
3	-0.01%	0.18	-0.43%	-2.68	-2.46
CAR(-3,3)	1.11%	2.58	0.16%	-0.18	

Table 10

Effect of Industry Characteristics on Differences in Target and Bidder Wealth Gains among Related Takeovers

For the sample of related mergers, the 7-day cumulative abnormal returns for targets and bidders are regressed against deal characteristics in Weighted Least Square regressions. Deals are assigned into two groups according to the level of fixed entry cost and market competition of the target industry.

Target

	Intercept	Cross Border	Cash	Hostile	Compete	Take 100%	Cross *FX	Cross *Stock	Size	Tax81	WWtax	Advisor
R&D<Median & H-index<0.18	0.0238	0.0506	0.0101	0.1389	-0.1188	0.1468	-0.3099			-0.0034	0.1159	0.0246
	(0.72)	(1.95)[b]	(0.47)	(2.77)[a]	(-3.81)[a]	(4.65)[a]	(-1.52)			(-0.15)	(1.55)	(1.13)
	N: 314 Adjusted R^2: 0.155											
Others	0.0276	-0.0158	0.1259	0.0465	-0.1016	0.2252	0.0224			-0.0442	0.0063	-0.0326
	(0.52)	(-0.50)	(4.76)[a]	(1.09)	(-2.10)[b]	(4.46)[a]	(0.08)			(-1.57)	(0.06)	(-1.18)
	N: 363 Adjusted R^2: 0.085											

Bidder

	Intercept	Cross Border	Cash	Hostile	Compete	Take 100%	Cross *FX	Cross *Stock	Size	Tax81	WWtax	Advisor
R&D<Median & H-index<0.18	0.0032	-0.0194	0.0003	0.0003	0.0145	0.0035	0.0763	0.0428	0.0014	0.0228	0.0150	0.0125
	(0.30)[a]	(-3.04)[a]	(1.60)	(0.02)	(1.21)	(0.39)	(1.88)[c]	(3.12)[a]	-0.86	(-3.66)[b]	(0.91)	(-1.88)[c]
	N: 6.11 Adjusted R^2: 0.036											
Others	0.0111	0.0066	0.0081	-0.0247	-0.0017	-0.0012	0.0169	-0.0017	0.0015	-0.0041	-0.0393	0.0027
	(1.05)	(-0.77)	(-1.48)	(-1.56)	(-0.12)	(-0.13)	(0.22)	(-0.12)	(1.01)	(-0.62)	(-0.75)	(0.42)
	N: 703 Adjusted R^2: -0.001											

a, b, and c denote for significance at 1%, 5%, and 10% respectively

Table 11

Differences in Target and Bidder Wealth Gains in Deals Within Selected Industries

For the sub-sample of mergers in the medical equipment, drugs, chemicals, electrical equipment, automobiles, aerospace, telecommunication, computers, chips and the software industries, the 7-day cumulative abnormal returns for targets and bidders are regressed against deal characteristics in Weighted Least Square regressions. Deals are assigned into two groups according to the level of fixed entry cost and market competition of the target industry.

Target

	Intercept	Cross Border	Cross Industry	Cash	Hostile	Compete	Take 100%	Cross *FX	Cross *Stock	Size	Tax81	WWtax	Advisor
R&D<Median & H-index<0.18	0.0583	0.1625	-0.0097	0.0172	0.0615	-0.0918	0.0943	0.1369			-0.0045	-0.1702	-0.0023
	(0.87)	(3.54)[a]	(-0.17)	(0.68)	(1.48)	(-2.39)[b]	(3.21)[a]	(0.36)			(-0.17)	(-1.25)	(-0.09)
	N: 222 Adjusted R^2: 0.139												
Others	0.1997	-0.0077	-0.1416	0.0928	0.1208	-0.0925	0.1134	0.0058			-0.0636	0.1912	0.0178
	(2.82)[a]	(-0.17)	(-2.59)[a]	(3.74)[a]	(1.53)	(-1.40)	(2.73)[a]	(0.01)			(-2.20)[b]	(0.73)	(0.66)
	N: 296 Adjusted R^2: 0.111												

Bidder

	Intercept	Cross Border	Cross Industry	Cash	Hostile	Compete	Take 100%	Cross *FX	Cross *Stock	Size	Tax81	WWtax	Advisor
R&D<Median & H-index<0.18	0.0482	-0.0345	-0.0161	0.0054	0.0198	-0.0139	-0.0210	-0.0264	0.0330	0.0008	-0.0136	0.0381	-0.0046
	(1.91)[c]	(-2.34)[b]	(-0.95)	(0.67)	(1.01)	(-0.92)	(-1.47)	(-0.24)	(1.66)[c]	(0.37)	(-1.59)	(1.04)	(-0.50)
	N: 432 Adjusted R^2: -0.001												
Others	-0.0094	0.0328	0.0274	-0.0070	-0.0222	-0.0240	-0.0142	0.1917	-0.0150	-0.0004	0.0025	-0.0825	-0.0006
	(-0.56)	(2.32)[b]	(2.20)[b]	(-1.00)	(-0.63)	(-1.00)	(-1.32)	(1.75)[c]	(-0.69)	(-0.25)	(0.24)	(-0.56)	(-0.07)
	N: 527 Adjusted R^2: -0.001												

a, b, and c denote for significance at 1%, 5%, and 10% respectively

Table 12

Differences in Target and Bidder Wealth Gains in Deals Involving Different Foreign Countries

The 7-day cumulative abnormal returns for targets and bidders are regressed against deal characteristics in Weighted Least Square regressions. Other countries, cross-industry, cash, hostile, compete and take100% are binary variables set equal to one for deals where the bidder is from countries other than UK and Canada, cross-industry deals, pure cash offers, hostile takeovers, deals with competing bids and deals in which the acquirer owns 100% of the merged firm, respectively. FX is defined as the quarterly percentage deviation of U.S. real exchange rate index from its average level during the sample period. Size is the logged ratio of the deal value to the bidding firm's market capitalization three months before the announcement date. Tax81 is a dummy variable for deals announced during 1981-1986. WWtax is a binary variable that is equal to one for U.K. and Japanese acquirers during the period of 1981-1986. Advisor indicates those deals in which the target firms' financial advisors are top investment banks. t-statistics from the Weighted Least Square regression are reported in parentheses.

	Intercept	Other Countries	Cross Industry	Cash	Hostile	Compete	Take 100%	FX	Size	Tax81	WWtax	Advisor
Target	0.0860	0.0844	-0.0076	-0.0021	0.0706	-0.1544	0.1632	-0.3106		-0.0742	0.1161	-0.0104
	(1.98)[b]	(3.83)[a]	(-0.34)	(-0.08)	(2.13)[b]	(-4.78)[a]	(4.85)[a]	(-2.11)[b]		(-1.62)	(2.61)[a]	(-0.47)
	N: 342 Adjusted R^2: 0.161											
Bidder	0.0319	-0.0117	-0.0037	-0.0131	-0.0105	-0.0008	-0.0082	0.0767	0.0022	-0.0207	0.0150	-0.0038
	(2.99)[a]	(-2.07)[b]	(-0.67)	(-2.07)[b]	(-0.63)	(-0.07)	(-1.21)	(1.84)[c]	(1.25)	(-1.38)	(0.98)	(-0.51)
	N: 437 Adjusted R^2: 0.017											

a, b, and c denote for significance at 1%, 5%, and 10% respectively

Table 13

The Significance of Foreign Exchange Exposure from Stock Returns

This table presents the summary statistics on the foreign exchange exposure elasticity estimates using stock returns as the measure of changes in firm value. The regressions are run over the 1977 through 2000 time period. Panel A provides the average absolute values of the exposure elasticity estimates and their corresponding t statistics across all 737sample firms. The last column provides the total percentages of firms with positive or negative exposure elasticity estimates significant at the 10% levels. Panel B and C provides similar statistics on firms with significantly (at 10%) negative and positive exposures, respectively.

Panel A: All Firms

	abs(β)	abs(t-β)	Adjusted R^2	Percentage
Model 1	0.3720	0.87	0.05%	13.03%
Model 2	0.3478	0.85	17.46%	10.72%
Model 3	0.3540	0.89	17.42%	13.57%
Model 4	0.3323	0.84	20.52%	11.13%

Panel B: Firms With Significantly Negative Exposures Elasticity

	β	t-β	Adjusted R^2	Percentage
Model 1	-0.7571	-2.03	1.17%	10.99%
Model 2	-0.6196	-1.97	22.31%	3.66%
Model 3	-0.7271	-2.08	19.54%	9.36%
Model 4	-0.7680	-2.00	22.32%	5.70%

Panel C: Firms With Significantly Positive Exposures Elasticity

	β	t-β	Adjusted R^2	Percentage
Model 1	0.9337	1.95	1.10%	2.04%
Model 2	0.8882	2.14	16.28%	7.06%
Model 3	0.8850	2.02	17.67%	4.21%
Model 4	0.7945	2.10	20.82%	5.43%

Table 14

Sub-periods Foreign Exchange Exposure Elasticity Analysis

This table presents the summary statistics on the foreign exchange exposure elasticity estimates for firms with significantly (at 10% level) positive or negative exposure elasticity in the two sub-periods. Each panel provides the average values of the exposure elasticity and their corresponding t -statistics across all the 737 firms. The last columns represent the percentage of firms with significantly (at 10% level) negative and positive exposure elasticity.

Panel A: 01/1977-04/1988

Firms With Significantly Negative Exposures

	β	t-β	Adjusted R^2	Percentage
Model 1	-1.0829	-2.09	2.75%	11.94%
Model 2	-1.0077	-2.09	31.61%	7.19%
Model 3	-1.0470	-2.09	29.76%	6.24%
Model 4	-1.0086	-2.13	34.95%	6.24%

Firms With Significantly Positive Exposures

	β	t-β	Adjusted R^2	Percentage
Model 1	1.4179	1.93	3.20%	0.95%
Model 2	1.0996	2.14	27.94%	4.21%
Model 3	1.1022	2.17	30.17%	4.88%
Model 4	1.0815	2.23	33.03%	5.02%

Panel B: 05/1988-12/2000

Firms With Significantly Negative Exposures

	β	t-β	Adjusted R^2	Percentage
Model 1	-1.2135	-2.13	2.47%	4.21%
Model 2	-1.2045	-2.07	14.98%	3.12%
Model 3	-1.3251	-2.22	12.80%	7.73%
Model 4	-1.5997	-2.22	15.47%	4.34%

Table 14 – Cont.

Firms With Significantly Positive Exposures

	β	t-β	Adjusted R^2	Percentage
Model 1	1.4569	2.13	2.72%	5.43%
Model 2	1.2766	2.11	11.58%	10.85%
Model 3	1.3710	2.19	10.97%	3.66%
Model 4	1.4234	2.10	14.17%	6.65%

Table 15
The Significance of Foreign Exchange Exposure from Earnings Forecasts

This table presents the summary statistics on the foreign exchange exposure estimates using the analyst forecasts data. EPS_{jt} is the mean analyst forecast of annual earnings per share for firm j in month t, P_{jt} is the price of firm j during the previous month, FX_t is the exchange rate for month t. DUM_{it} indicates the starting month of earning forecasts issued for a new fiscal year. The regressions are run over the 1977 through 1996 time period. Panel A provides the average absolute values of the exposure and the dummy variable estimates and their corresponding t statistics across all the 439 firms. The last column provides the total percentages of firms with positive or negative exposure elasticity estimates significant at the 10% level. Panel B and C provides similar statistics on firms with significantly (at 10%) negative and positive exposures, respectively.

$$\frac{EPS_{j,t} - EPS_{j,t-1}}{P_{j,t-1}} = \alpha_j + \beta_j \left(\frac{FX_t - FX_{t-1}}{FX_{t-1}}\right) + \varepsilon_{j,t} \qquad (5)$$

$$\frac{EPS_{j,t} - EPS_{j,t-1}}{P_{j,t-1}} = \alpha_j + \beta_j \left(\frac{FX_t - FX_{t-1}}{FX_{t-1}}\right) + d_j DUM_{j,t} + \varepsilon_{j,t} \qquad (6)$$

Panel A: All Firms

	abs(β)	abs(t-β)	Adjusted R^2	Percentage
Model 5	0.0569	0.95	0.002	16.86%
Model 6	0.0512	0.87	0.325	14.12%

Panel B: Firms with Significantly Negative Exposure

	β	t-β	Adjusted R^2	Percentage
Model 5	-0.2314	-2.11	0.016	3.42%
Model 6	-0.2400	-2.19	0.275	5.01%

Panel C: Firms with Significantly Positive Exposure

	β	t-β	Adjusted R^2	Percentage
Model 5	0.0724	2.16	0.015	13.44%
Model 6	0.0830	2.10	0.336	9.11%

Table 16

Comparison of Financial Characteristics between Firms with and without Significant Exchange Rate Exposure

Monthly stock returns are regressed against the CRSP value weighted index returns and percentage change of foreign exchange rate. Firms with and without significant foreign exchange exposures are compared in terms of their quick ratio, short-term leverage, growth opportunities, size as measured by sales, dividend payout, R&D expenses and selling expenses. Differences in median between firms with and without significant exposures and P-values from the Wilcoxon rank-sum test of no differences are also provided. a, b, and c denotes significance level at 1%, 5% and 10% respectively

Panel A: 01/1977—04/1988

Year	Exposure	N	Quick	Current	ST-Leverage	Coverage	Size	Dividend	Leverage *M/B	Leverage *R&D	Leverage *Sellexp
	0	456	1.2632	2.4461	0.2341	8.4497	170	.	0.1834	0.0028	0.0305
1977	1	67	1.2787	2.4491	0.2416	8.8181	148	.	0.1719	0.0028	0.0267
	0	473	1.2597	2.4741	0.2382	8.0723	177	0.0221	0.1835	0.0028	0.0308
1978	1	67	1.2311	2.2963	0.2440	9.3310	177	0.0215	0.1786	0.0029	0.0260
	0	487	1.1981	2.3461	0.2511	8.0297	191	0.0225	0.1818	0.0027	0.0307
1979	1	68	1.1724	2.3883	0.2510	7.4418	189	0.0235	0.2003	0.0036	0.0255
	0	499	1.1615	2.2834	0.2599	7.5540	216	0.0233	0.1977	0.0026	0.0305
1980	1	68	1.1763	2.3294	0.2570	6.7220	233	0.0240	0.2142	0.0034	0.0266
	0	515	1.1708	2.2865	0.2506	6.2348	237	0.0224	0.2133	0.0031	0.0316
1981	1	67	1.2698	2.3591	0.2489	6.2468	251	0.0234	0.2076	0.0040	0.0248
	0	540	1.2069	2.3435	0.2436	5.8657	231	0.0211	0.1880	0.0032	0.0318
1982	1	69	1.2324	2.2418	0.2348	6.8961	264	0.0225	0.1688	0.0041	0.0287
	0	550	1.2956	2.4864	0.2301	5.0776	209	0.0196	0.2102	0.0036	0.0355
1983	1	71	1.2758	2.4054	0.2153	4.6993	256	0.0200	0.2074	0.0047	0.0295
	0	593	1.3679	2.5039	0.2266	5.9375	186	0.0182	0.2374	0.0036	0.0311
1984	1	80	1.3286	2.3705	0.2271	5.6031	212	0.0212	0.1958	0.0034	0.0264
	0	601	1.2662	2.4110	0.2391	6.9423	224	0.0170	0.2220	0.0039	0.0331
1985	1	80	1.2027	2.1561	0.2314	5.8039	265	0.0171	0.2029	0.0042	0.0306

Table 16 – Cont.

Year	Exposure	N	Quick	Current	ST-Leverage	Coverage	Size	Dividend	Leverage *M/B	Leverage *R&D	Leverage *Sellexp
	0	612	1.2957	2.4102	0.2304	5.2197	220	0.0155	0.2503	0.0043	0.0360
1986	1	80	1.3685	2.2021	0.2332	4.7826	269	0.0166	0.2263	0.0049	0.0319
	0	615	1.2177	2.3473	0.2256	5.1030	249	0.0149	0.2861	0.0047	0.0413
1987	1	75	1.1648	2.1832	0.2330	3.8126	310	0.0166	0.2483	0.0052	0.0331
	0	622	1.2110	2.2004	0.2398	5.3547	266	0.0145	0.2683	0.0045	0.0413
1988	1	79	1.0840	2.0682	0.2572	4.6425	351	0.0159	0.2796	0.0050	0.0392
	(1)-(0)		**-0.0070**	**-0.0659**	**-0.0004**	**-0.0609**	**36**	**0.0015**	**-0.0066**	**0.0007**	**-0.0040**
	P-value		**0.47**	**0.04**[b]	**0.40**	**0.27**	**0.07**[c]	**0.18**	**0.24**	**0.06**[b]	**0.00**[a]

Panel B: 05/1988—12/2000

Year	Exposure	N	Quick	Current	ST-Leverage	Coverage	Size	Dividend	Leverage *M/B	Leverage *R&D	Leverage *Sellexp
	0	613	1.1857	2.1717	0.2443	5.3796	285	0.0148	0.2859	0.0047	0.0388
1989	1	72	1.0775	2.1354	0.2550	4.9125	355	0.0148	0.3140	0.0054	0.0503
	0	607	1.1796	2.1586	0.2496	4.5015	298	0.0152	0.2843	0.0045	0.0415
1990	1	72	1.0750	2.0244	0.2653	3.7812	372	0.0133	0.4507	0.0058	0.0566
	0	608	1.1218	2.1210	0.2458	4.0129	300	0.0146	0.2290	0.0048	0.0434
1991	1	73	1.0340	2.0327	0.2571	3.0067	356	0.0121	0.3310	0.0059	0.0588
	0	604	1.1435	2.0641	0.2411	3.4488	285	0.0128	0.2588	0.0046	0.0410
1992	1	70	0.9888	1.8423	0.2502	3.3531	393	0.0106	0.3580	0.0050	0.0517
	0	607	1.1125	2.0828	0.2464	4.3044	295	0.0129	0.2778	0.0045	0.0397
1993	1	70	1.1531	2.0060	0.2334	3.5888	387	0.0091	0.3491	0.0047	0.0489
	0	598	1.0998	2.0668	0.2430	4.8784	323	0.0125	0.3254	0.0044	0.0373
1994	1	71	1.0601	2.1076	0.2367	3.8631	407	0.0083	0.3956	0.0047	0.0480
	0	595	1.1030	2.0359	0.2493	6.7072	378	0.0130	0.3081	0.0040	0.0343
1995	1	72	1.0778	1.9801	0.2648	5.6003	473	0.0091	0.3874	0.0041	0.0501
	0	575	1.0960	2.0386	0.2492	6.7567	452	0.0133	0.3285	0.0039	0.0351
1996	1	70	1.1138	2.2074	0.2409	6.0324	566	0.0110	0.3609	0.0041	0.0437

Table 16 – Cont.

Year	Exposure	N	Quick	Current	ST-Leverage	Coverage	Size	Dividend	Leverage *M/B	Leverage *R&D	Leverage *Sellexp
	0	556	1.0955	2.1015	0.2440	6.8538	486	0.0130	0.3531	0.0041	0.0355
1997	1	72	1.1135	2.0979	0.2500	6.9546	598	0.0110	0.3889	0.0048	0.0421
	0	523	1.0955	2.0824	0.2410	6.9001	546	0.0119	0.4136	0.0043	0.0347
1998	1	68	1.0272	1.9560	0.2566	6.8478	594	0.0091	0.5167	0.0040	0.0426
	0	486	1.0381	1.9532	0.2327	5.1961	605	0.0109	0.3800	0.0049	0.0407
1999	1	61	1.0018	1.8466	0.2375	4.9048	824	0.0091	0.4486	0.0051	0.0400
	0	445	1.0329	1.9131	0.2440	4.5698	668	0.0103	0.3808	0.0051	0.0438
2000	1	57	1.0429	1.9684	0.2580	5.0339	930	0.0061	0.4293	0.0045	0.0455
	(1)-(0)		**-0.0402**	**-0.0502**	**0.0076**	**-0.3402**	**88**	**-0.0031**	**0.0771**	**0.0002**	**0.0093**
	P-value		**0.02**[b]	**0.12**	**0.06**[c]	**0.24**	**0.05**[b]	**0.01**[a]	**0.00**[a]	**0.07**[b]	**0.00**[a]

Table 17

Comparison of Exchange Rate Exposure Between Firms with Different Costs of Financial Distress

Each period, firms with significant exchange rate exposure are divided into high and low groups according to their expected costs of financial distress. The mean and median of the absolute exposure of each group are presented. P-values from the Wilcoxon rank-sum test of no differences in exposure between the two groups are also provided. a, b and c denote significance level at 1%, 5% and 10% respectively.

		01/1977-04/1988		05/1988-12/2000	
		Low	High	Low	High
Quick	mean	0.9946	1.0555	1.5966	1.4159
	median	0.8660	0.9523	1.0133	1.4286
	p-value	(0.10)[c]		(0.07)[c]	
Current	mean	1.0296	1.0204	1.5812	1.4310
	median	0.8496	0.9120	0.9215	1.3916
	p-value	(0.19)		(0.02)[b]	
ST-Leverage	mean	1.0477	1.0024	1.1844	1.8178
	median	1.0073	0.7904	1.0027	1.3887
	p-value	(0.14)		(0.01)[a]	
Coverage	mean	1.1087	0.9413	1.7645	1.2523
	median	1.0053	0.8316	1.3454	1.0411
	p-value	(0.17)		(0.09)[c]	
Size	mean	1.2384	0.8116	2.0632	0.9610
	median	1.1826	0.7369	1.6605	0.7825
	p-value	(0.00)[a]		(0.00)[a]	
Dividend	mean	1.2488	0.8013	2.1147	0.9108
	median	1.2041	0.7034	1.6605	0.7825
	p-value	(0.00)[a]		(0.00)[a]	
Leverage*log(M/B)	mean	0.9695	1.0806	1.4074	1.6004
	median	0.8313	1.0276	1.3513	1.0078
	p-value	(0.05)[b]		(0.07)[c]	

Table 17 – Cont.

		01/1977-04/1988		05/1988-12/2000	
		Low	High	Low	High
Leverage*R&D	mean	0.9108	1.0622	1.3344	1.8634
	median	0.8363	1.0089	1.0731	1.4320
	p-value	(0.12)		(0.12)	
Leverage*Sellexp	mean	0.9221	1.1280	1.2520	1.7492
	median	0.8316	1.0126	1.0913	1.2894
	p-value	(0.06)[c]		(0.23)	

Table 18

The Exchange Rate Exposure of Industry Portfolios

For each equally and value-weighted industry portfolio, the following equation is used to estimate their exchange rate exposures. Each industry's average trade balance over the period of 1989-1998 is also provided.

$$R_{j,t} = \alpha_j + \beta_j VWRET + \gamma_j R_t^{fx} + \varepsilon_{j,t}$$

SIC	α	β	γ	α	β	γ	Trade Balance
	Equal-weighted			Value-weighted			
20	-0.0014	0.8101	0.1671	0.0024	0.9518	-0.1100	3,986,016,534
	(-0.71)	(17.14)	(1.50)	(0.91)	(14.89)[a]	(-0.73)	
22	-0.0047	0.8131	0.5679	-0.0082	0.9861	0.7112	-1,323,786,566
	(-1.37)	(9.85)[a]	(2.91)[a]	(-1.93)[c]	(9.52)[a]	(2.91)[a]	
23	-0.0130	1.0573	0.9002	-0.0091	1.1571	0.4478	-31,650,729,309
	(-3.10)[a]	(10.35)[a]	(3.73)[a]	(-2.23)[b]	(11.62)[a]	(1.91)[c]	
24	-0.0004	0.95668	0.94473	-0.0073	1.2166	0.7899	-2,386,233,313
	(-0.09)	(8.50)[a]	(3.56)[a]	(-1.68)[c]	(11.44)[a]	(3.15)[a]	
25	-0.0006	0.86654	0.75092	-0.0019	0.9961	0.6647	-4,670,699,459
	(-0.17)	(9.56)[a]	(3.51)[a]	(-0.62)	(13.16)[a]	(3.72)[a]	
26	-0.0038	0.92998	0.26828	-0.0034	0.9615	0.0119	-1,465,332,026
	(-1.39)	(14.15)[a]	(1.73)[c]	(-1.07)	(12.45)[a]	(0.07)	
27	-0.0026	0.86645	0.42502	-0.0030	0.9023	0.4448	1,559,150,552
	(-1.07)	(14.69)[a]	(3.05)[a]	(-1.36)	(16.75)[a]	(3.50)[a]	
28	-0.0033	1.15143	0.14811	0.0036	0.9612	-0.1473	16,974,721,263
	(-0.95)	(13.72)[a]	(0.75)	(1.61)	(17.74)[a]	(-1.15)	
29	-0.0007	0.8442	-0.0695	0.0063	0.5244	-0.5227	-4,840,811,984
	(-0.19)	(8.72)[a]	(-0.30)	(2.24)[b]	(7.70)[a]	(-3.25)[a]	
30	-0.0020	0.8505	0.5933	-0.0050	1.1373	0.3155	-4,381,189,008
	(-0.62)	(11.04)[a]	(3.26)[a]	(-1.47)	(13.63)[a]	(1.60)	
31	-0.0057	0.8357	0.7806	-0.0137	1.2682	0.3524	-10,929,510,914
	(-1.41)	(8.43)[a]	(3.34)[a]	(-2.59)[a]	(9.86)[a]	(1.16)	
32	-0.0033	0.9348	0.4545	-0.0046	1.0157	0.6621	-3,298,147,090
	(-0.96)	(11.13)[a]	(2.29)[b]	(-1.22)	(11.15)[a]	(3.08)[a]	
33	-0.0068	0.9532	0.4307	-0.0074	1.0353	0.1206	-11,172,985,599
	(-1.94)[c]	(11.21)[a]	(2.15)[b]	(-2.28)[b]	(13.09)[a]	(0.65)	
34	-0.0031	0.8683	0.4193	-0.0023	0.9066	0.2804	-591,429,141
	(-1.06)	(12.07)[a]	(2.47)[b]	(-0.82)	(13.12)[a]	(1.72)[c]	
35	-0.0053	1.1899	0.2470	-0.0054	1.3437	-0.0359	2,083,540,273
	(-1.32)	(12.18)[a]	(1.07)	(-1.43)	(14.64)[a]	(-0.17)	
36	-0.0024	1.2435	0.3072	0.0001	1.3421	-0.0317	-21,201,714,450
	(-0.57)	(11.96)[a]	(1.25)	(0.01)	(13.79)[a]	(-0.14)	

Table 18 – Cont.

SIC	α	β	γ	α	β	γ	Trade Balance
	Equal-weighted			Value-weighted			
37	-0.0019	0.9042	0.5706	-0.0016	0.9922	0.0440	-21,745,393,972
	(-0.58)	(11.48)[a]	(3.07)[a]	(-0.57)	(14.96)[a]	(0.28)	
38	-0.0039	1.0561	0.2435	-0.0003	0.9930	-0.2194	4,032,733,335
	(-1.15)	(12.71)[a]	(1.24)	(-0.13)	(18.08)[a]	(-1.69)[c]	
39	-0.0103	0.9641	0.5816	-0.0047	1.0510	0.1410	-18,520,074,438
	(-2.92)[a]	(11.24)[a]	(2.87)[a]	(-1.22)	(11.17)[a]	(0.63)	

a, b, and c denote significance at 1%, 5% and 10% levels respectively.

Table 19

Fixed Effect Analysis of the Time and Industry Varying Foreign Exchange Exposure

Each year, firms are sorted into industry portfolios according to their previous year's 2-digit SIC codes. Then monthly industry portfolios returns are regressed on the CRSP value weighted index returns, and the interaction between foreign exchange rate, industry monthly trade shares and firms' financial characteristics. To facilitate comparison between different variables, we use the inverse of quick ratio, current ratio, size, dividend payout as the proxy for expected cost of financial distress. a, b, and c denote significance at 1%, 5% and 10% levels respectively.

$$R_{i,t} = \alpha + \beta_1 R_{mt} + \beta_2 R_t^{fx} \log\left(\frac{IMP_{it}}{V_{it}}\right)(\text{expected cost of financial distress}) + \beta_3 R_t^{fx} \log\left(\frac{EXP_{it}}{V_{it}}\right)(\text{expected cost of financial distress}) + \varepsilon_{i,t} \quad (7)$$

	α	β_1	β_2	β_3
No Interaction with Distress Cost	-0.0099	0.9501	0.2153	-0.3659
	(-2.99)[a]	(47.88)[a]	(3.29)[a]	(-6.28)[a]
1/Quick	-0.0097	0.9480	0.3333	-0.5067
	(-2.91)[a]	(47.64)[a]	(3.13)[a]	(-5.52)[a]
1/Current	-0.0097	0.9477	0.6348	-0.9133
	(-2.91)[a]	(47.54)[a]	(3.31)[a]	(-5.38)[a]
ST-Leverage	-0.0100	0.9489	0.6798	-1.3279
	(-3.01)[a]	(47.91)[a]	(2.79)[a]	(-6.27)[a]
1/Size	-0.0100	0.9497	1.0333	-1.9062
	(-3.02)[a]	(47.94)[a]	(3.15)[a]	(-6.55)[a]
1/Dividend	-0.0101	0.9550	0.0015	-0.0033
	(-3.03)[a]	(47.86)[a]	(2.09)[b]	(-5.49)[a]
Leverage*log(M/B)	-0.0094	0.9450	0.7791	-1.3539
	(-2.79)[a]	(46.47)[a]	(0.97)[a]	(-1.79)[c]
Leverage*Sellexp	-0.0101	0.9512	1.1192	-1.7150
	(-3.02)[a]	(47.78)[a]	(4.62)[a]	(-7.27)[a]

Industry Groups: 19
Time series length: 120

Table 20

Reaction of Stock Price to Foreign Exchange Shocks

For each firm with earning forecast changed after the announcement of Plaza Accord, the absolute values of the 5-day cumulative abnormal returns are calculated and regressed against firm characteristics as of the end of 1984 in a weighted least square regression (WLS). The result is shown in column one. Then these firms' daily return volatilities in the 91 days around the announcement of the Plaza Accord (VAR1) are calculated and compared with their volatilities for the same period in 1984 (VAR0). Since some firms have extremely negative interest rate coverage ratio, we replace the actual coverage ratio with a dummy variable that takes the value of one when a firm's coverage ratio is above the sample median and zero otherwise. The logged ratios of these two volatilities are regressed against firm characteristics in column two. t-statistics are in parentheses for these two columns. In column three, for each of the 735 sample firms, the mean absolute values of the 5-day cumulative abnormal returns around all large exchange rate movements are regressed against firm characteristics. t-statistics based upon White (1980) standard errors are reported in parenthesis in the third column. a, b, and c denote significance at 1%, 5% and 10% levels respectively.

	The Plaza Accord		Other Large Movements
Dependent variable	CAR(-2,2)	Log(VAR1/VAR0)	CAR(-2,2)
Intercept	0.02794	0.1895	0.0631
	(3.08)[a]	(0.79)	(9.74)[a]
Quick	0.0026	-0.0177	0.0011
	(1.49)	(-0.42)	(0.80)
ST-Leverage	0.04333	1.0002	0.0268
	(2.68)[a]	(2.34)[b]	(2.12)[b]
Coverage Dummy	-0.00688	-0.1267	-0.0022
	(-2.63)[a]	(-1.78)[c]	(-1.10)
Log(sales)	-0.00174	-0.0936	-0.0029
	(-2.07)[b]	(-3.99)[a]	(-4.80)[a]
Dividend	-0.15062	1.4036	-0.2511
	(-2.93)[a]	(1.02)	(-3.72)[a]
Leverage*log(M/B)	0.0087	-0.3401	0.0167
	(0.72)	(-1.33)	(1.95)[c]
Leverage*Sellexp	-0.02301	0.1341	0.0413
	(-0.47)	(0.13)	(1.64)[c]
N	424	424	735
Adj-R^2	0.063	0.046	0.167

Appendix C

Figures

Figure 1

Time Series of the Ratio of Mergers Relative to Other Types of Foreign Direct Investment in the U.S., 1987-1994

Each year, the average number of M&A and other form of foreign in each of the Fama-French 48 industry groups is calculated. M&A/Direct Entry reflects the ratio of M&A relative to joint venture and new plants.

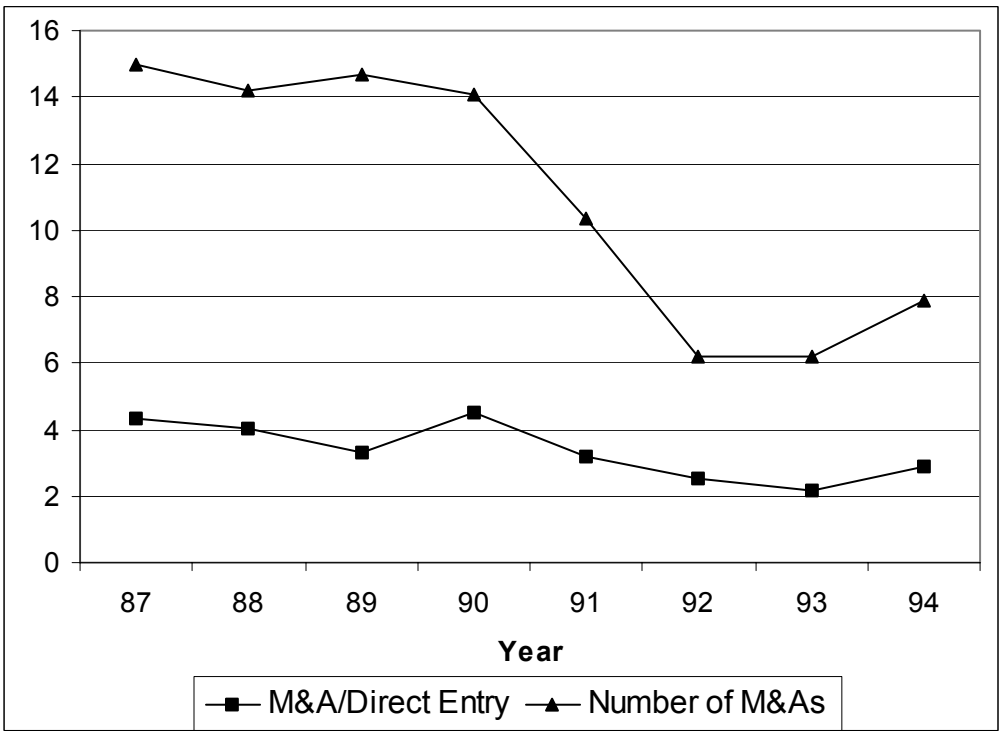
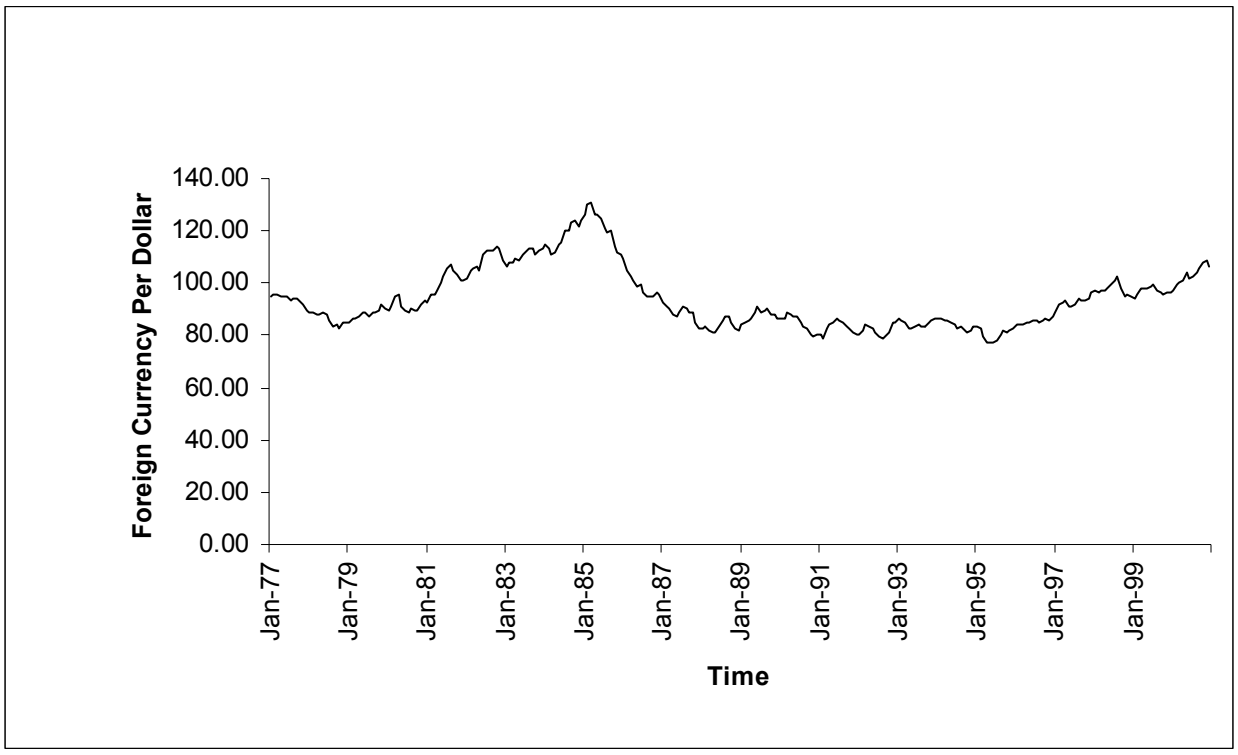


Figure 2

Real Trade-Weighted Value of the U.S. Dollar (01:1977--12:2000)



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Vita

Dan Wei was born in Wuhan, P. R. China on September 2, 1971, the daughter of Suhua Ma and Feng Wei. After completing her high school at The Wuhan No. 6 Middle School, Wuhan, she entered The Tianjin Univeristy studying engineering economics in 1989. After receiving her degree of Bachelor of Science from The Tianjin University and a diploma in Technical English in June 1993, she entered the Master's program in International Finance at The Nankai University, Tianjin. In August 1995, she left for the United States to study Economics at The Texas A&M University, College Station. During the following two years, she completed her Master's degree in Economics. In August 1997, she attended Arizona State University to study for a Ph.D. in Finance. A year later, she transferred to the University of Texas at Austin to continue her Ph.D. in Finance.

Permanent Address: 760 JianShe Blvd., Wuhan Evening News Agency,

Wuhan, P. R. China 430010

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